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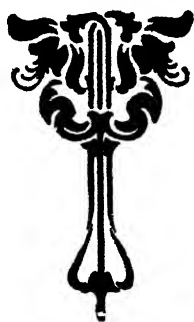
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Board of Agriculture and Forestry

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C. S. JUDD,
Superintendent of Forestry.

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To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

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THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, JANUARY, 1920.

No. 1

With the present high price paid for hides, the article in this number on the subject of tanning may be found of timely interest.

It is satisfactory to know that trees such as the Australian red cedar and the Bermuda juniper, introduced into these islands in comparatively recent times, are now so well established as to produce seed which is available for propagation purposes.

The article in this number entitled "Flowers" is reproduced by permission of the author, Mr. R. I. Lillie, whose success in growing ornamental flowers has resulted in one of the most beautiful yards in Honolulu. His directions for raising plants are based on actual experience and will be found of great value to those desiring to have a flower garden.

The Entomologist's article, in this issue, on the infestation of the Australian fern weevil, calls attention to the serious results which may possibly follow if the invasion is allowed to remain unchecked. Householders may help in the work of eradication by destroying all discovered weevils and the ferns which they are infesting, and by refraining from moving any ferns from one locality to another.

The Chief Plant Inspector points out in this number the feasibility of shipping plants in a bare root condition from Oahu to the other islands, provided they receive the proper care. Recently the Division of Forestry shipped by mail 120 Norfolk Island and Kauri pine trees to Hilo, packed in damp moss. They were seven days in the box before being opened and were then found to be remarkably fresh and in good condition.

The Fern Weevil Menace

By D. T. FULLAWAY, *Entomologist*.

Brief mention was made in the October *Forester* of the discovery, in September, of a serious infestation of the beautiful Sadleria ferns in the neighborhood of Kilauea by the Australian fern weevil, *Syagrus fulvitaris*, and of the efforts made to

suppress it. With the result of this undertaking still uncertain, a more troublesome situation is disclosed. The weevil, it is found, has escaped from one or two greenhouses in Hilo, to which it was supposed to be confined, and has spread all over the city, from Wainaku to Waiakea, on the fish-tail fern. It does not appear feasible to eradicate it in so extensive an area, and the only control measure which recommends itself at present is isolation, which may serve to protect the forests from invasion for a period. At all events, the possibility of invasion is no longer remote, and it seems important to consider now what the consequence would be should this beetle succeed in securing a firm foothold in the forests.

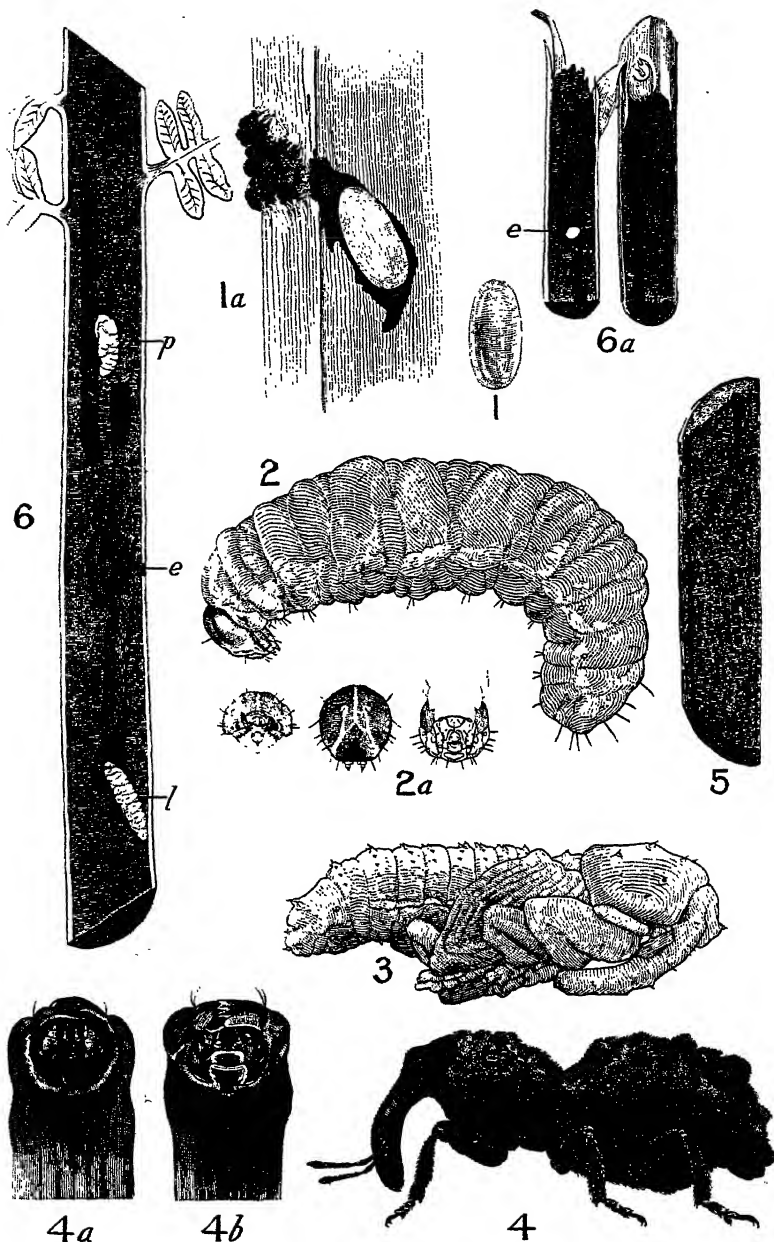
An examination of the *Sadleria* ferns in the mountains back of Honolulu, where the beetle has been present for 15 years, reveals the destructive nature of the insect. The fern growth there is thin, compared with that at Kilauea, yet it is impossible to find a single plant that has not suffered severely from the ravages of the beetle. As the attacks appear to be continuous, it seems certain that the ferns, in spite of their hardness, will eventually succumb. At Kilauea, the shattered condition of the ferns was more noticeable on account of the thickness of the stand. In these dense forests, ferns constitute an important part of the ground cover. It is to be expected that their destruction will be followed by a train of attendant evils, such as the entrance of light, drying of the ground, the invasion of weeds, etc. The sensitiveness of the Hawaiian forests to disturbance is so well known that the result can be definitely predicted—a progressive debility of the trees on the edge of the invaded areas, a dying back of the forest, ultimately its extinction. It would seem necessary, therefore, to make every effort to prevent the fern weevil from gaining further access to the forests.

Illustrations of the different stages of the fern weevil accompany this article.

Notes on Plant Shipments

BY E. M. EHRHORN, *Chief Plant Inspector.*

Since the approval of Rule XX of the Division of Plant Inspection, which concerns inter-island shipments of plants, fruits, vegetables, sugar cane and other vegetable products, much inquiry has come to the Division regarding the requirement necessary for the shipment of these commodities. The public does not seem to appreciate the importance and necessity for the rules and regulations which the Board of Agriculture and Forestry promulgates. When we consider that Honolulu is the important port of entry for all the islands where vessels enter from foreign countries which are either bringing cargoes here for home use, or which call here for bunker fuel, provisions and water while in



THE FERN WEEVIL, (*Syagrius fulvitaris* Pasc.)—1, egg (greatly enlarged); 1a, section of fern stem showing egg-chamber (greatly enlarged). 2, larva; 2a, head of larva from front, above, and beneath, showing mouthparts (x10). 3, pupa (x10). 4, adult weevil (x10); 4a, b, apical extremity of rostrum showing mouthparts (greatly enlarged). 5, section of fern stem showing gallery of freshly-hatched larva (somewhat enlarged). 6, section of fern stem showing galleries of more advanced larvae and pupal chamber with exit; l, larva, p, pupa,

transit, we must at once realize that the danger of introduction of some insect pest or plant disease is more liable at this port than anywhere else in these islands. This being the case, and to avoid the possible spread of such insects which might gain a foothold on Oahu, to any of the other islands, Rule XX was approved on June 1, 1919.

There need not be any anxiety for loss or destruction on the part of the shipper of any commodity in this rule if he complies with the regulations noted therein. Any infested fruit, plant, vegetable or other material of a vegetable nature will not be allowed shipment to the other islands. No sugar cane, even when desired as food on the trip to the other islands, will be permitted shipment, unless it has been first examined and properly tagged by the plant inspector. All taro, lily root and tubers cannot be shipped unless they have first been cleaned from clinging soil and properly tagged by the plant inspector.

All plants from the roots of which the soil has been washed off, when free from scale insects and diseases, can be shipped when properly tagged by the plant inspector. Any plant not so treated and found in the possession of a passenger will be seized and forbidden shipment.

Soil is the greatest carrier of disease germs and insect pests, especially in their immature stages. The Japanese rose beetle, anomala beetle, ants and many other pests were brought to these islands in soil many years ago and, since the inspection laws have been enforced, the grubs of the above pests have been found on several occasions in the soil of plant shipments from foreign countries. Not very long ago, in the soil of a medium-sized pot plant from Japan, 122 grubs of a beetle similar to the Japanese rose beetle were found. Had this plant not been stopped by the plant inspector, we would without doubt have had another serious pest to contend with.

Many people have an idea that shipping plants without soil means the death of the plants. As in all things, there is a right way and a wrong way to pack and ship plants. Even some of the nurserymen and florists do not seem to know how to ship plants by mail from the mainland to Hawaii. Frequently we find young rose plants in cardboard boxes or wrappers crushed flat by the weight of the mail bags, and the plants dead and as dry as a bone. These same persons send such plants to nearby towns in their state, and yet do not realize that from the far eastern states to Hawaii it takes two weeks with two or three handlings before the plants arrive here. Their attention has been called to this matter, but very few seem to improve the conditions. The Division of Plant Inspection will gladly verify the arrival of poorly packed plants and individuals need not lose their money. If a plant is carefully handled, the soil carefully removed, preferably by washing it off so as not to injure the tender rootlets, and is then packed in well-moistened moss and each plant carefully wrapped by itself, there should be no loss in such shipments.

Many people just shove a plant into a box without moss or anything moist, expecting the plants to arrive in good condition, with the result that in most cases the plant dies.

Another important matter in shipping plants from which the soil has been removed, is that after planting them in the open where the hot sun can reach them, good protection should be given the plants with a covering for a few days until they can get established. Very tender plants can be repotted and kept in the shade for a few weeks, and then transferred to the garden in a permanent place.

These suggestions are very important and should be well considered by those who contemplate shipping plants. The plant inspector's office is located on Kekuanaoa street at the rear of Lucas' mill, Honolulu, where all information regarding the importation and shipping of plants, fruits, vegetables, seeds and all agricultural products can be obtained.

Flowers*

BY R. I. LILLIE.

The highest success in flower growing presupposes perseverance and constant daily attention. He who is not prepared to give this need expect only failure or at best mediocre results. But the gardener who gives such attention and follows simple principles will be surprised at the richness of the beauty which will reward his efforts.

I find there are four S's to be very carefully considered, namely:

Seasons. I begin sowing my seeds for spring flowers as early as November and keep on sowing at intervals to the end of June. After that date, the weather generally gets hot and dry, and, with the exception of a few fall flowers, such as cosmos and dahlias, I find that, as a rule, poor results follow. The hot weather forces the flowers into bloom without their gaining full development and growth, and the results are very unsatisfactory.

Our season here is at least two months earlier than California and four months earlier than the Eastern States. This has to be carefully considered, as sowing seeds out of their proper season will get but little response from the plants. I have heard a local store man selling seeds to a lady and stating that we have no seasons here and that you can sow seeds all the year around in this climate and get good results. This is not so, and nothing is more discouraging to a gardener than to find seeds dried out and failing to germinate or producing spindling little plants with puny flowers merely because the seeds were planted out of season. A plant always tries to catch up with its proper season; for instance, sow cosmos in the early spring, and it will bloom before

it is a foot high, whereas if it is sown in June or July, it will often grow to six feet.

In most catalogues, you will find lists of flowers that should be grown in certain months, but it is well to remember that these lists are intended for the Eastern States mostly, so that for this climate you will have to advance the seasons accordingly.

Seeds. This is the all important matter, especially in this climate where seeds, if kept even a few weeks, lose all vitality. Any housekeeper knows that most of the cereals used in homes get weevily or musty in a very short time. I send East to one of the reliable growers of seeds a list of my wants in the seed line about the end of October and instruct them to forward them in installments as the new seeds come into market, and are ready to send out. I do not limit them in price, but ask that only the *best and freshest, and tested seeds be sent*. There are many reliable seedsmen and it is important to locate a few who can be depended upon to fill orders for fresh stock only and then place your order with them. If you have not had experience, inquiry of someone who has been growing flowers or of the Experiment Stations or the Board of Agriculture and Forestry will result in your receiving addresses of several firms, who are known to sell good seeds. H. May & Co., C. J. Day & Co., and probably other Honolulu dealers are willing to order seeds for you from any house that you may prefer if you wish to order through a local dealer. A special order usually brings far better seeds than those that are placed on the general market in packets.

It is a good plan to test seeds for yourself. Take a damp sheet of blotting paper and sprinkle on it a few seeds, then put another sheet of blotting paper over it, damp it also, keep it moist on a plate for a few days, and if there is any vitality in the seeds they will germinate between the sheets. If you count the seeds you can get the percentage of germination. If the seeds do not show any vitality, poor results will follow sowing. Two years ago I got one ounce of Pansy seeds from Boston; I intended to make several sowings to get a rotation of flowers. The day after the arrival of the seeds, I sowed one box. I estimated 90% grew. Three weeks later, I sowed another box from the same package, and got less than 50% plants, and two weeks later still, I sowed the balance and did not get 10%. This has been my experience with most seeds. To get results, get only *new, fresh seeds*, and sow immediately on arrival.

Sowing. I start most of my seeds in shallow boxes on benches protected from ants. The ants dearly love such seeds as pansy seeds, and if they can get at them, will dig up the last one of them. You may try this by spreading a few pansy seeds on the ground where ants frequent, and you will soon see them being packed away for future use in their storehouse. The boxes I use are about four inches deep, with small holes in the bottom for drainage. I fill in about three inches of finely sifted soil composed of about one-half well washed sand and one-half leaf

mould, well mixed. Press down firmly with a smooth piece of wood. Sprinkle thoroughly with boiling water to kill ants and other pests, and when cool sprinkle the seeds on the flat surface. Cover very lightly with finely sifted soil, but see that all seeds are covered, then press down again firmly. The greatest mistake is to cover the seeds too deeply. I have seen people sowing seeds and covering them an inch and a half deep. These seeds could never get through, and the planters were wondering why they did not come up. The seed books say that seeds should be covered only five times the diameter of the seeds, and I find a light covering more successful than a heavier. In sowing some of the very fine seeds I smooth out the soil carefully, spread a sheet of white tissue paper on the soil, and sprinkle the seeds on the paper, putting another sheet of tissue paper on top, and a slight covering of very fine soil over this. The paper below prevents the seeds sinking too deeply into the soil, and the top sheet prevents the seeds being disturbed while they are sending out their tiny roots. It is very important that seeds, while germinating, should not be disturbed, and as long as the soil keeps moist, avoid watering, but if the soil becomes dry, I use a fine sprayer, such as florists use or a tin one that is used to spray insects. One that makes a mist is best. Some sow seeds in shallow flower pots and place these in a saucer with water so the soil is kept moist from below by the water in the saucer. I also cover the seed boxes with cotton frames to keep from the sun. This helps to keep the soil moist, for if the sun dries out the surface of the soil, in all probability, the seeds will be killed. When the young plants are too crowded in the boxes, prick them out and plant in other boxes till ready to transplant into the garden. I generally change when the young plant has four leaves, and transplant later, when, say two inches high, but only experience can tell you how to treat each individual plant. Some are delicate and some are robust. Seedlings like Shirley Poppies, are very hard to transplant and should be sown where they are to be grown.

Soil. To have a good garden, you must thoroughly dig and turn over the soil to the depth of at least two feet. Most of my garden has been trenched to the depth of three feet. Also the soil must be pulverized and aired by being thoroughly raked. In this climate and soil, fertilizer is an absolute necessity in the gardens, as it is in the cane field. I see gardens in this city that do not seem to have been fertilized for years, and no wonder plants are stunted and hard to grow. Every fall, I dig my garden deeply, and give it a generous amount of old, rotted cow manure or horse manure. I generally have my supply on hand six months before using it. If commercial fertilizer is to be used to supplement the manure it must be applied with judgment, for disastrous results will follow excessive applications. I keep a little bone meal and lime for my personal use on the soil, but never entrust it to any employee.

Plant out your young plants in the late afternoon, so as to give them the cool night to get located and established. I have seen people planting out young plants in the blazing sun, and not watering them for hours. I always water as I plant out. In watering gardens, I see the yard boys sprinkling the surface and know that the water does not penetrate two inches and never reaches the roots. It is better to give a garden a good soaking once a week than a daily imitation of a watering which dries out in a few hours. Get the water deep into the soil. As soon as the flowers are done blooming cut them off. If the dead flowers are not removed from the plant, it will soon cease blooming. Vegetables, I treat in the same manner, but there is not so much necessity to start in boxes, as the seeds are usually larger and harder than flower seeds, but I raise lettuce, parsley, celery and onions in boxes first, and then plant out.

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WHY GENERAL PERSHING'S HORSE WAS HELD IN QUARANTINE.

When it became known in New York and Washington that General Pershing would not be allowed to make his triumphal march through the principal thoroughfares of the many cities, which had prepared a glorious "Welcome Home" for him, at the head of the returning heroes, mounted on his famous horse, "Kidron," on which thousands of officers and men had seen him throughout his campaigns in France and Belgium, so many protests against "Kidron" being sent to quarantine were voiced, that the Federal Department of Agriculture felt constrained to issue to the press a circular of information, from which the following paragraphs are quoted:

"Kidron," the horse that General Pershing rode to victory in the world war, began his career as a laurel wreath collector by getting in quarantine.

It is not that "Kidron," so far as anybody knows, has any infectious disease, but simply that he may have any equine disease, he must stay at the port of entry for five months, until the government veterinarians know that he is a safe animal to be at large. "Kidron" will remain at Newport News for 140 days.

The position taken by the Department of Agriculture is that, under no circumstances, can sentiment be permitted to interfere with the protective measures that have been worked out, slowly and sometimes precariously, for the protection of the livestock interests of the country. "Kidron" might possibly be affected with glanders or farcy, dourine, distemper or strangles, epizootic lymphangitis, or some other disease which may or may not be present in the United States. But, whether or not the disease that he might have exists at this time in this country, the probability would be that, traveling around the country as he would,

any contagion carried by the horse would be spread by him to such an extent that it would cause possibly millions of dollars of damage.

"Kidron" would have been rather an exceptionally dangerous horse to turn loose. The private's horse is picketed up at the front or at camp, under the supervision of the army veterinarians, and is pretty carefully guarded from contagious diseases. "Kidron," on the other hand, went wherever his master chose to ride him and may have touched noses with any number of French horses having any kind of contagious disease.

If "Kidron" were released from quarantine, he would probably visit scores of cities throughout the country, and if he had a disease, might spread it beyond all reasonable possibility of eradication. For these reasons, the Department of Agriculture thought it wise not to create any sort of favored status for him.

HOME TANNING OF SKINS.

When it is desired to preserve the skins of wild animals which have been shot or trapped, these may be tanned either with the hair on or off, as desired. Hair can be removed from hides by soaking them in tepid water made alkaline by lye or lime. The following recipe for a tanning liquor is furnished by the Biological Survey of the United States Department of Agriculture: To each gallon of water add one quart of salt and one-half ounce of sulphuric acid. This mixture should not be kept in a metal container. Thin skins are tanned by this liquor in one day; heavy skins must remain in it longer. They may remain in it indefinitely without harm.

When removed from this liquor the skins are washed several times in soapy water, wrung as dry as possible, and rubbed on the flesh side with a cake of hard soap. They are then folded in the middle, hung lengthwise over a line, hair side out, and left to dry. When both surfaces are barely dry, and the interior is still moist, they are laid over a smooth, rounded board and scraped on the flesh side with the edge of a worn flat file, or a similar blunt-edged tool. In this way an inner layer is removed and the skins become nearly white in color. They are then stretched, rubbed and twisted until quite dry. If parts of a skin are still hard and stiff, the soaping, drying and stretching process is repeated until the entire skin is soft. Fresh butter, or other animal fat, worked into skins while they are warm, and then worked out again in dry hardwood sawdust, or extracted by a hasty bath in gasoline, increases their softness.

DEAD ANIMALS FED TO HOGS MAY SPREAD TUBERCULOSIS.

Warning against the feeding of diseased cattle carcasses to hogs is sounded by the United States Department of Agriculture. A conference of state and federal officials, held early in October, to deal with matters of tuberculosis eradication, brought to light numerous instances where hogs contracted tuberculosis after feeding on carcasses of tuberculous cattle. In one case nearly an entire drove of hogs showed lesions of tuberculosis, which at first the owner could not account for. Later he admitted to the veterinarian investigating the case that several months before he had fed to the hogs the carcass of a cow that "never did very well."

The Bureau of Animal Industry urges livestock owners to have a careful autopsy made on animals dying on the farm or killed because of sickness, in order that the definite cause of trouble may be learned. Carcasses that show lesions of infectious diseases should not be fed. Instead such carcasses should be cared for so that no part can be eaten by hogs. Thorough destruction of the carcass by burning, or by deep burial under a liberal application of quicklime, is the proper procedure in such cases. Attention is called also to the danger of feeding offal from slaughtered animals to swine, as such a practice is another source of infection.

Division of Forestry

Honolulu, Hawaii, December 6, 1919.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of November, 1919:

TREE PLANTING.

Owing to the continued dry weather, reforestation on the reserves was confined to the planting of 717 koa trees in Makiki and 1050 bloodwood trees in Mikilua, a total of 1767 trees. At the Waiahole nursery several hundred kauri and Norfolk Island pine trees were transplanted into tins in preparation for the planting out on the land that is now being cleared for this purpose.

KAPAA NURSERY.

Through the offer of Mr. G. S. Raymond, principal of Kapaa school, Kauai, an opportunity has been presented to supply a part of the demand for trees for planting out on Kauai, by the use of the 600 school pupils whom Mr. Raymond desires to secure experience in the practical work of tree raising. Many of these children come from homesteads where trees are desired, and in this way the demand can be supplied very advantageously. A supply of shooks for 50 seed boxes, nails,

screens for preparing the soil, and seed has been sent to Mr. Raymond for this purpose.

ARBOR DAY.

On November 20, I gave a lunch talk before the Rotary Club on Arbor day, which was celebrated on November 21 by fitting exercises in most of the public schools. The distribution of trees from the Government Nursery for planting out on this day on Oahu only amounted to a total of 6292, of which 1390 trees were called for in person by school children.

ADVICE ON TREE PLANTING.

On November 10, I accompanied officials of the Outdoor Circle to Schofield Barracks and assisted in giving advice and suggestions to General Hodges and Colonel Dashiell concerning the beautifying of the new officers' quarters by the planting of trees and shrubs.

Suggestions were also given to Major Holland of Fort Armstrong concerning the use of hedge plants for camouflage purposes.

KAUAI TRIP.

From November 3 to 8, I was on Kauai with the Governor and president of the Board of Health making an inspection of the Kokee camps. These were found to have been all cleaned up and Dr. Trotter personally gave advice on the ground to the permittees as to the further precautions which should be taken to guard the purity of the water in the Kokee streams so that camping could be continued. A few new sanitary clauses will soon be suggested by the Board of Health for inclusion in the camping permits, and during the next camping season a Board of Health inspector will make fortnightly rounds of the camps.

On this same trip arrangements were made to secure a supply of koa seed, which was found in abundance at the head of Waimea canyon at an elevation of 3500 feet. A few dozen seeds were also obtained from the only known tree in existence of the Kauai variety of the *Kokia* or native red cotton tree, *Kokia Rockii Kauaiensis*, which was found in Kahoaloha valley, mauka of Mana.

GRASS CUTTING.

On account of the complaints voiced by Tantalus residents against the use of the Round Top road by grass wagons, all grass cutting on government lands on Round Top and Tantalus has been absolutely stopped. A few wagons will go up there, however, to remove grass cleared off the road by the prison gang and grass taken by permission from privately owned land. The Division of Forestry has no jurisdiction over such grass removal. Incidentally, it may be mentioned that this grass goes to the small dairies in the Kapahulu district which have been a standby in furnishing a large part of the milk supply of the Dairy-men's Association.

Respectfully submitted.

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, Hawaii, November 30, 1919.

Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit a report of the principal work done during the month of November, 1919.

NURSERY

Distribution of Plants:

	Trans- plant Boxes	Seed Boxes	Pot Grown	Total
Sold	150		41	191
Gratis (including forest reserves)	910	2800	30	3740
Total	1060	2800	71	3931

ARBOR DAY.

The total number of plants distributed for Arbor Day planting amounted to 6292. The distribution of plants was as follows:

9 schools received	553 trees
1390 children called at Nursery on Arbor Day and received 1 tree each	1390 trees
58 people applied by letter, the number of trees ordered being	1232 trees
182 people called at Nursery and gave orders, amounting to a total of	3117 trees
Total	6292 trees

COLLECTIONS.

Animal Industry Revolving Fund:

Lae Plantation (on account of swine plague).....	\$ 49.25
Princeville Plantation (on account of anthrax).....	399.00
	<hr/>
	\$448.25

Government Realizations:

Collections on account of plants sold.....	\$.80
Rent of office building Nursery grounds for October....	35.00
	<hr/>
Total	\$35.80

COLLECTING SEED.

The writer, accompanied by two seed boys, spent a day collecting seed at Kunia. A number of the eucalyptus trees planted by Mr. van Valkenburg are now bearing seed. The red cedar of Australia, *Cedrela Australis*, first introduced by Mr. van Valkenburg about eight years ago, is also bearing. Mr. van Valkenburg at that time received 200 young trees which we cared for at the Nursery here until they recovered from the effects of the voyage. Later we received from Mr. E. C. Smith a package of seed of the red cedar which we propagated, distributing the plants to a number of people on the different islands. These trees have also started to bear seed.

We have tested the seed and found it good. The *Cedrela Australis* is classed as one of the most valuable timber trees in Australia. It attains a height of 200 feet and a girth of 18 feet.

Another tree of recent introduction and also bearing fertile seed, is the *Juniperus Bermudiana*, introduced by Mr. Gerrit P. Wilder nine years ago. Trees of this species planted on the trail leading from Makiki Station to Sugar Loaf hill are now about 15 feet high with a stem of from four to six inches at the butt.

Juniperus Australis, another valuable forest tree, is showing signs of

fruiting. This tree is also of recent introduction, the first seed of this species having been received from Jamaica through our exchange system about seven years ago.

PLANTATION COMPANIES AND OTHER CORPORATIONS.

The number of trees distributed under this heading amounted to 1000 pot grown plants.

MAIKIKI STATION.

The work done at this station was principally routine. We are getting ready for the planting season and have a large quantity of trees ready.

HONOLULU WATERSHED PLANTING.

Koa trees to the number of 717 were planted in Opu valley during the month. Trails around Sugar Loaf hill were cleared.

ADVICE AND ASSISTANCE.

The writer has made the following number of calls and given advice and assistance otherwise, at the request of people in and around the city:

Calls made	6
Advice given by phone.....	4
Advice to people calling	9

Respectfully submitted.

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, Hawaii, November 30, 1919.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month the insectary handled 25,600 pupae of the melon fly, from which there were bred 3756 females and 2435 males, *Opus fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opus fletcheri.

Oahu:

	Females.	Males.
Moiliili	2050	1980
Wahiawa	500	450
Hawaii:		
Kamuela	200	200

FRUIT FLY PARASITES.

Diachasma tryoni.

Oahu:		
Kalihi valley	400	350
Waipahu	150	150
Hawaii:		
Kohala	20	20
Maui:		
Paia	100	100

Tetrastichus giffardianus.

Oahu:	
Kalihi Valley	500
Wyllie Street	200
Waipahu	1000
Maui:	
Paia	400

Dirhinus giffardi.

Oahu:	
Nuuanu	900

Galcus silvestri.

Oahu:	
Nuuanu	1600

Opius humilis.

	Females.	Males.
Oahu.		
Kalihi	50	50
Wyllie Street	25	25

Diachasma fullawayi.

Oahu:		
Waipahu	20	20
Wyllie Street	50	50
Kalihi Valley	50	50
Hawaii:		
Kohala	10	10
Maui:		
Paia	50	50

Respectfully submitted.

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, Hawaii, November 30, 1919.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of November, 1919, as follows:

During the month 43 vessels arrived at the port of Honolulu, 21 of which carried vegetable matter and 3 vessels came through the Panama Canal Zone. The following disposition was made of the various shipments:

Passed as free from pests	956 lots	32,525 pkgs.
Burned	85 lots	85 pkgs.
Fumigated	7 lots	7 pkgs.
Returned	1 lot	1 pkg.

Total inspected..... 1049 lots 32,618 pkgs.

Of these shipments, 32,301 packages arrived as freight, 138 packages as mail and 179 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 14,991 bags of rice from Japan, 250 mats of rice from China, and 1376 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 3752 pieces of baggage belonging to immigrants from foreign countries were examined, from which 41 lots of fruit and 41 lots of vegetables were seized and destroyed. One lot of fruit was sent back on board.

On November 8 a package of chestnuts and a case of plants from the mainland found in the mail per "Nippon Maru," were fumigated.

On November 15 two packages of seeds from India imported by Dr. H. L. Lyon for scientific purposes under permit No. 1989, were passed.

On November 17 three baskets of narcissus bulbs, brought by a passenger from China under government permit No. 2124, were fumigated. Also a package containing rice seeds found in the mail from Manila was burned, it being contraband.

On November 18, per "Niagara," one package of dried insects for the H. S. P. A. arrived and was passed.

On November 25, by the "Colombia," a package of rice seeds found in the mail from Manila was seized and destroyed, being prohibited, and a package of castor beans from India for the U. S. experiment station was fumigated as a precaution. One lot of barley and oats found in the baggage of an immigrant from Manila was seized and destroyed, being prohibited under Quarantine Notice No. 39.

During the month some indications of codling moth in apples and indications of potato scab on a few shipments of potatoes were noted, and immediately notice was sent to all commission merchants on the Coast regarding these conditions, with a warning that all future shipments found infested would be returned or destroyed.

HILO INSPECTION.

Brother M. Newell, inspector at Hilo, reports the arrival of seven steamers at Hilo. Five carried vegetable matter consisting of 233 lots and 5686 parcels, all passed as free from insect pests.

KAHULUI INSPECTION.

Mr. Will J. Cooper, inspector at Kahului, reports the arrival of five vessels, of which one only, the S. S. "Manoa," brought vegetable matter consisting of 1123 packages of fruits, plants and vegetables, all being found free from infestation.

INTER-ISLAND INSPECTION.

Fifty-four steamers plying between Honolulu and the other island ports were attended and the following shipments passed as free from pests:

Pineapple shoots	8200 bags
Taro	551 bags
Vegetables	354 pkgs.
Fruit	206 pkgs.
Plants	142 pkgs.
Bulbs	2 pkgs.
Taro tops	4 bags
Sugar cane	7 pkgs.
Total passed	9466 pkgs.

Eighteen pots of plants were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, Hawaii, December 19, 1919.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to herewith submit my report on the work of the Division of Animal Industry for the month of November, 1919:

TUBERCULOSIS ERADICATION.

The attention of the Board has in previous reports been called to the action of the federal Congress, approved July 24, 1919, appropriating one million dollars for the compensation of owners of tuberculous cattle slaughtered for the purpose of eradicating the disease. This appropriation, which forms part of the regular annual appropriation for the federal Department of Agriculture, was originally so worded as to exclude Hawaii from benefiting by it, "territory" having been left out of the specification of localities where the money could be expended, such as "states, counties or municipalities." This omission, however, was corrected through the efforts of the chief of the federal Bureau of Animal Industry, and all arrangements were made for the partial indemnification to be assumed by said federal department when another obstacle has imposed itself and now threatens to prevent the cooperation aimed at.

The opinion has been advanced, and has tentatively received the support of the attorney general, that the federal compensation, which is limited to \$25 for a grade and \$50 for a purebred animal, is supplementary, in the meaning of *additional*, to the indemnification paid by the Territory.

The Territory, in accordance with Act 204, Session Laws of 1919, must appraise condemned tuberculous cattle at their market value, regardless of their being diseased, and must reimburse the owner with eighty per cent of the appraised value in all cases where the disease is not sufficiently advanced to prevent the use of the carcass for food, and with fifty per cent when it is necessary to condemn the carcass.

The amounts allowed by Act 204 are \$250 for a grade and \$350 for a purebred animal, when found upon post-mortem examination to be affected with tuberculosis. These amounts are liberal when it is considered that the owner gets rid of diseased cattle which are likely to spread the infection in his herd, and the writer has adhered to the

opinion that the proffered federal indemnity could not mean an additional premium to be paid to the owner, but was to be regarded more as an encouragement to those state legislatures which had not yet provided laws and indemnification funds for the suppression of tuberculosis. In the meantime, forms, vouchers and blanks forwarded by the federal Bureau of Animal Industry provide only for the indemnification of the owner directly by the said Bureau, while our law (Act 204, Session Laws, 1919) leaves no option except appraisal and reimbursement at present day market value, a contingency which, in an opinion rendered by the attorney general under date of October 8, "might result in the owner of the destroyed cattle being paid more than the full market value thereof."

The question has therefore been submitted to the chief of the federal Bureau of Animal Industry, pending whose decision the approval of local claims for reimbursement must remain in abeyance.

The testing of the herd of beef cattle at Wailupe resulted in the condemnation of 52 head out of 227. All of the reactors have been slaughtered and all were found upon post-mortem examination to be affected with tuberculosis, seven to such an extent as to require condemnation of the carcasses as unfit for food.

There still remain in the neighborhood of 50 animals untested and, as a number of these undoubtedly are affected, no time should be lost in catching and confining them in such a way that they can be handled. The complaint of neighbors, to the effect that there is liability of transmission of tuberculosis infection from these animals to their dairy herds, is not without reason. That the cattle are wild and parts of the pasture overgrown with thorny brush, in places nearly impenetrable, cannot be allowed as an excuse for continuing a center of infection which possibly may have been contributory to the persistence of the disease in that neighborhood. The animals which cannot be rounded up, roped or trapped, should be shot, and if the land is to be continued as a cattle ranch, subdivisions, pens and chutes that will allow of the proper handling of the cattle as domestic animals should be provided. The eradication of tuberculosis from a herd which on the first test has shown twenty-three per cent of infection cannot be accomplished in short order, unless extermination of the herd is decided upon, and that would undoubtedly prove the most economic measure in the long run. With beef prices where they are now and with the strong demand for light cattle persisting, it would seem to the writer that no more favorable time could be found for ridding a valuable property of a menace which can only detract from its usefulness and discourage development.

FORAGE POISONING ON OAHU.

An outbreak of forage poisoning was reported from one of the large pineapple plantations on the windward side of this island. Four mules had died within two days. Hemorrhagic septicemia was suspected, but careful post-mortems of two but recently dead animals failed to show any symptoms except those of acute indigestion with overloading and paralysis of the stomach as the direct cause of death. Recent rains had caused the appearance of an abundance of succulent feed, which, in connection with the ripening of numerous pineapples, proved too much of a temptation and the animals simply gorged themselves to death.

After removal of the remaining animals to less abundant pastures, no further death was reported.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Hawaii, November 30, 1919.

Dr. Victor A. Norgaard, Chief, Division of Animal Industry,
Board of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to submit the following report for the month of November, 1919:

TUBERCULOSIS CONTROL.

The following cattle were submitted to the tuberculosis test:

	Tested.	Passed.	Con- demned.
Kamehameha Schools	49	49	0
Joe Caspino	10	10	0
Antone Costa	1	1	0
Antone Pires	12	12	0
Antone, Joe	13	12	1
Kalihi Farm	31	31	0
J. B. Coelho	9	9	0
M. C. Souza	12	12	0
Fred Luning	22	21	1
M. Nakamura	41	39	2
R. Hind	8	8	0
C. M. Cooke	6	6	0
C. M. Cooke	1	0	1
Antonio Perry	227	175	52
C. H. Bellina	1	1	0
Waialae Ranch	316	292	24

The above tabulated list shows a total of 759 head of cattle tested during the past month; 678 were passed as free from tuberculosis and 81 were condemned and branded. Of the 81 condemned cattle, 5 have been slaughtered and 77 are segregated awaiting slaughter.

IMPORTATIONS OF LIVE STOCK.

A total of 31 vessels were boarded by the livestock inspector during the month and the following found to carry livestock for this Territory:

S. S. "Manoa," San Francisco—42 cts. poultry, various; 1 goat, Maui Dry Goods & Grocery Co.

S. S. "Maui," San Francisco—1 Shetland pony.

S. S. "Nanking," Orient—1 ct. chickens, Chuck Hoy.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

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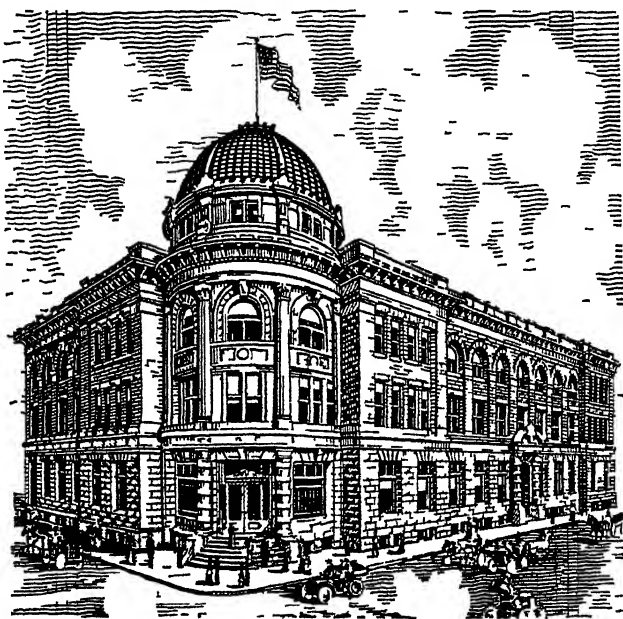
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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale, the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

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THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, FEBRUARY, 1920.

NO. 2

The Government Nursery sent out during December, 1919, a total of 103,036 tree seedlings for use in extensive planting operations on Oahu.

Out of a total of 143 head of dairy cattle tested during December, 1919, only three were found to be afflicted with tuberculosis and were condemned.

The Entomologist reared and distributed during December, 1919, a total of 12,660 beneficial insects to control local pests.

Of the 25,312 packages of vegetable matter arriving in Honolulu during December, 1919, the Division of Plant Inspection inspected and passed 25,200 packages and either burned, fumigated, or returned 112 packages which were not free from pests.

The Japanese cedar is probably the most suitable tree to raise in these Islands for Christmas trees. Its stiff branches will support the customary decorations, it will keep green for a long time, and can be raised for this purpose in two years after planting out.

Evidence of the dry conditions which have, until recently, obtained in parts of our forests is shown by the occurrence of a fire in the staghorn fern on November 29, 1919, in Wainiha Valley on Kauai, a place which is not many miles from what is supposed to be the rainiest spot in the world.

An experiment in the growing of timber trees, closely spaced, has been started recently on a few acres at Waiahole, Oahu. The trees selected are the kauri pine, which is the monarch of the New Zealand forests, where it reaches a diameter of 24 feet and produces a straight-grained, strong timber, free from knots and of remarkable durability; the Norfolk Island pine, which, in its native habitat, attains a diameter of 10 feet and produces a timber useful for ship-building and many other purposes; and the Japanese cedar, which produces a wood valued for many uses.

The Koa Tree

By C. S. JUDD, *Superintendent of Forestry.*

Probably the best known and most popular, for a variety of uses, of all the native Hawaiian trees is the koa, *Acacia Koa* Gray. It is the largest sized tree in the Hawaiian forest, is very widespread, and next to the ohia lehua is the most common. The koa is found on all the larger islands of the Hawaiian group and adapts itself to a great variety of conditions, although it prefers and grows best on a well drained soil.

GENUS.

The koa belongs to the genus *Acacia*, which boasts of approximately 500 species, which are distributed over the tropical and sub-tropical regions of both worlds, being especially numerous in Africa and Australia. In these islands the genus is represented by three species, one of which has two varieties:

Acacia Koa, the common species, which is familiar to all.

Acacia Koa lanaiensis, a smaller tree with shorter, almost straight leaves, found only on the island of Lanai.

Acacia Koa hawaiiensis, a tall tree, with very broad leaves which are almost straight, and found only on the island of Hawaii.

Acacia Kauaiensis, a large tree, with sickle-shaped, narrow leaves, flowers in panicles or pyramidal loosely-branched clusters, and found only on western Kauai.

Acacia Koaia, a smaller tree, with very hard wood and gnarled and twisted branches, pods narrower and somewhat curved, leaves stiff and narrow, and found at the lower elevations on the dry portions only of Molokai, Maui, and Hawaii.

ORIGIN.

How the koa first came to the Hawaiian Islands is a much mooted question. Its hard, horny seeds do not float in water and are therefore not adapted to dispersal by ocean currents. It does not seem probable that the koa was introduced by human agency, because of the very long time that the tree has been here. This is evidenced by the endemic fauna of birds and insects which are quite restricted to or dependent on the koa for their existence and which prove that the host tree is a very ancient denizen of these islands. The seed of the koa may have been first brought here by birds, and it is not unlikely that the tree found its way to this region by terrestrial immigration over a continent which at one time may have connected this group with Australasia and Indo-Malaysia, but which has since sub-



YOUNG KOA TREE.

Showing true, compound leaves. Attained a height at Kolekole Pass, Oahu, of $5\frac{1}{2}$ ft. during a very dry season 13 months after planting.

sided. It is an interesting fact, however, that the almost exact counterpart of our koa is found in *Acacia heterophylla* of Mauritius, thousands of miles away from Hawaii in the Indian Ocean, and that the blackwood tree, *Acacia melanoxylon* of Australia, which closely resembles our koa, exhibits habits of growth and characteristics which are strikingly like our own species.

COMMON NAME.

The Hawaiian name given to this tree has a variety of meanings, some of which seem well suited to it. The word *koa* means "soldier" and "bold" and "valiant," each of which might be applied to the upright, martial bearing of the tree. It also means "a barren, fruitless plant or tree," which might well be applied to the koa, which yields no edible fruit. The adjective also means "irregular in habit," which particularly suits the koa, for besides growing straight and tall in moist situations where good soil abounds, it also assumes a very sprawling habit with twisted branches on situations where tree growth is not so favorable.

DESCRIPTION OF THE TREE.

The koa is one of the most stately of the Hawaiian forest trees and is found in a variety of situations, from a few hundred feet above sea level to 7,000 feet on the higher mountains. It grows best on a well-drained soil and prefers a moderate amount of moisture. When grown in the open the koa develops a symmetrical crown with usually a short, thick trunk, branching out very often only a few feet above the ground. In such situations the lower branches will frequently sprawl over the ground for long distances. A maximum diameter of 10 feet at the ground has been observed for the trees which have only a short trunk.

When grown closely in the wet forest on deep, rich soil, the koa will attain a height of 100 feet with a clean, straight bole without a branch for 40 feet above the ground, and it was such trees that were utilized for canoes.

The tree has a shallow rooted system, a flat plane of roots spreading out in all directions just beneath the surface of the ground. For this reason the larger top-heavy trees are easily overturned by severe wind storms or when the trees are unusually exposed to the wind by abrupt openings in the forest.

The koa will thrive in comparatively dry regions, but in such places it assumes a rather stunted and misshapen form. It usually has growing beneath its shade the fern ground cover which characterizes the ohia lehua, though, as it grows generally in somewhat drier situations, its undergrowth is usually not so luxurious. The ie-ie vine especially is not often seen in a koa forest. The koa is often found on ancient a-a lava flows

to the exclusion of everything else, and in such situations it is the finally established native vegetation following the ohia lehua forest and is considered to be the ultimate forest type.

FOLIAGE.

The koa appears still to be in a process of evolution, for it has two kinds of leaves. The true leaf of the koa, which appears first upon the germination of the seed, is a compound bipinnate leaf. These are soon replaced as the tree grows, and the foliage matures into phyllodes which are the leaf stalks dilated into flattened stems and which in themselves become leaves and perform the usual functions of leaves. Although these are not true leaves, they are referred to as such in the first part of this article.

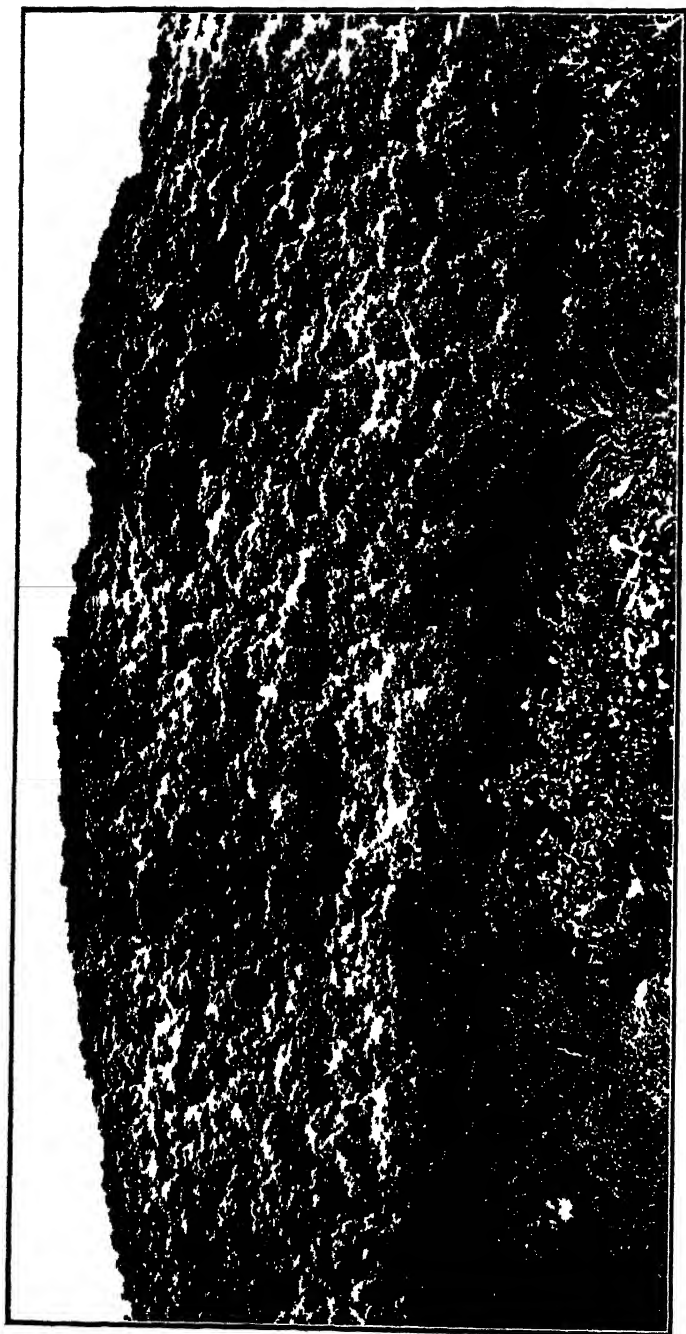
The true, compound leaf is found on young seedlings and on larger trees near the ground, where there is shade and moisture. They also are found springing from adventitious buds near the base of the trunk. As the foliage becomes more exposed to the light and heat these true, tender, compound leaves take on the new form of sickle-shaped phyllodes, which are coarser and more heat-resisting. Xerophytic conditions are responsible for the cause of the change from true leaves to phyllodes, a characteristic which was probably not evolved in Hawaii, but inherited from its ancestor on Australian soil. The Hawaii variety of koa develops very broad phyllodes at the higher altitudes, where there is more moisture in the form of fog and mist.

SEEDS.

The blossom of the koa consists of a small, densely globose, flowered head of a yellowish color, which develops into flat pods or legumes up to six inches long, brown in color, and which usually open on the tree. In each pod there are up to 12 seeds, which are flat, hard and shiny, and dark brown to black in color. The seed of the koa on Oahu is brown, about the size of and resembles an apple seed. The Hawaii variety of koa has a seed twice the size and is darker, while the seed of *Acacia Kauaiensis* is almost round, flat, and black. The horny seed often remains on the tree for a year after it ripens, and when lying dormant in the ground it is known to have retained, for a period of 25 years, its ability to germinate. To hasten sprouting when planting the seed, it is necessary first to soak it for 24 hours in very hot water.

INSECT ENEMIES.

As the seed pods mature they are attacked by the larvae of four different species of Tortricid moths, which feed on the young growing seeds, working from one to another until often



PLANTING KOA FOREST

On the Honolulu Watershed Forest Reserve, years old

every seed in a pod is destroyed. Owing probably to forest depletion and the consequent upsetting of the balance of nature, the native hymenopterous parasites which attack the larvae of these moths are not so efficient in keeping them in check, with the consequence that almost every new crop of koa seed is now badly infested.

A spanworm also in places denudes the koa trees of their phyllodes or leaves, working in large numbers for a few weeks. Here again the damage is due to disturbed forest conditions, because under normal conditions which formerly existed the dense undergrowth, since removed, presented favorable moist conditions for the fungus which destroyed the spanworm larvae when they came down to the ground to pupate.

NATURAL REPRODUCTION.

The common method that the koa has of reproducing itself is by seed, but in order to germinate and grow it requires the full, warm sunlight, and will not successfully sprout in the shade. Young seedlings spring up remarkably well after a fire has passed over the ground. The seed that escapes incineration seems to be prepared for germination by the warmth of the fire, and many a burned-over area has been reclothed with a new forest in this manner from seed that has lain dormant in the soil. Young seedlings in large numbers are often found coming up from seed in a fringe or circle around the mother tree, representing the group method of natural reproduction. The koa will also reproduce in a less satisfactory manner by suckers coming up from the roots of old trees.

WOOD.

The wood of the koa is probably the most valuable, commercially, of all Hawaiian trees and is the best known. The koa does not exist in large enough tracts to make extensive logging operations profitable. It was formerly put on the market as "Hawaiian mahogany." Owing also to its comparative inaccessibility and high freight rates, it is now cut only in small quantities, sufficient to supply the local demand for furniture, cabinet work and musical instruments. The sapwood of the koa is white. The heartwood, which seasons well without splitting, is moderately heavy and hard, and varies in color through many rich shades of dark red to a golden brown. The grain is fine and indistinct, and is capable of receiving a high polish. The curly grain, which is often found in the wood of trees growing in the drier localities, gives the curious fiddle-back appearance and is highly prized. The wood has been used for the interior finish of houses with rich effects. The bark of the koa has valuable tannic properties.

CANOE WOOD.

The ancient Hawaiians used koa wood for canoes, house timbers, surf boards, paddles, and spears. It was used more for canoes than for house timbers, the thatched houses being generally framed with naio, uhiuhi, kauila, mamani, and kamani. The longest surfboards, up to 16 feet in length, were made of the koa, but the tree was preeminently prized in the early days because it furnished the largest and most suitable wood for their canoes, which were hollowed out of a single log. The wood of the breadfruit, kukui, ohia-ha, and wiliwili was also used for canoes, but in limited quantities. Ellis records having seen one koa canoe "upwards of sixty feet long and between two and three feet deep," but as a rule they seldom exceeded fifty feet in length.

The building of a canoe was an affair of religion. A sound koa tree suitable for a canoe was decided upon by the aid of a kahuna's visions. The canoe builder also trusted to Lea, a patroness of the canoe, who was supposed to appear in the form of the friendly elepaio, who indicated a proper tree, neither worm-eaten nor decayed, and whose movements when she walked upon the newly-felled tree were attentively observed, and were ominous of good, or ill, luck. After the koa tree was felled by the use of stone adzes, it was rudely shaped and then hauled by means of strong ropes, made of hau bark, to the ocean, where the body was finished, the additional trimmings lashed on, and the steadying outrigger adjusted. The latter consisted of the iako, two arched hau sticks, which held the ama, or parallel float, made usually of wiliwili wood. Often two canoes were rigged together and made the very seaworthy double canoe, or kau-lua. The canoe, with its furniture, was considered a valuable possession, of service both to the people and to the chiefs, and if it had not been for the fine large koa trees which supplied the main body for the canoe, the early natives would have been without proper means of ocean travel and would have been handicapped in their fishing operations and their wonderful trading voyages to other lands.

Very few koa canoes are made today, and the large trees suitable for their construction have almost entirely disappeared.

PRESENT VALUE.

The chief present value of the koa tree today is not as a lumber producer, but is in the form of a forest which acts as a beneficial cover on our mountain slopes to prevent erosion and to hold the rainfall. The extensive koa forests of the early days have been greatly reduced by the ravages of man, cattle, and fire, and good stands are now found only in the more inaccessible regions where they have received protection. Elsewhere the koa occurs in open groves and as surviving individuals.



TRUNKS OF LARGE KOA TREES ON HAWAII

USE IN REFORESTATION.

The koa is a suitable tree to use in reforesting denuded areas where good drainage and favorable soil and moisture conditions obtain. The seedlings are easy to handle in the nursery, and young trees reach in two months a height of from 6 to 8 inches and are then ready for planting out. The koa has a comparatively rapid growth during its earlier years. In favorable localities it will attain a height of 30 feet in five years and, if planted 15 by 15 feet apart, will during the same time form a complete crown canopy over the ground.

New Pests on the Mainland

BY E. M. EHRHORN, *Chief Plant Inspector.*

THE JAPANESE BEETLE OF THE EASTERN STATES.

During the last few months newspapers have published articles about the appearance of the Japanese beetle in New Jersey. From letters and specimens received from New Jersey, the pest is not the common Japanese rose beetle that we have in these Islands, but is closely related to the *Anomala* beetle and feeds on many plants during the daytime. This pest (*Popilia japonica*), it is claimed, was introduced some seven or eight years ago in soil with imported iris roots from Japan. From all accounts this beetle does considerable damage to grapes, peach, plum, apples, cherry and many ornamental shrubs, weeds and various truck crops, especially sweet potatoes and sweet corn. In the case of corn the beetle penetrates the tips of the ears, working in a similar way as does the corn ear worm, and as it remains in these ears for an indefinite time, it could be transmitted in shipments of green corn to various markets; fortunately we are too far away from the eastern states for green corn shipments.

The Federal Horticultural Board of Washington, D. C., has placed a quarantine on certain portions of New Jersey, and the Bureau of Entomology and the State of New Jersey are cooperating in trying to eradicate this pest.

FLAG SMUT AND TAKE-ALL DISEASES.

These diseases have appeared on the mainland in the States of Illinois and Indiana.

Flag smut affects the leaf blades, leaf sheaths, stems and, at times, the spikes of wheat. The losses to crops from this disease run from one-tenth to one-half of the crop. The spores are

carried on the seed and live over in the soil. This disease is known to exist in Australia, East India and Japan.

Take-all disease, also known as whitehead or footrot, attacks the roots and the bases of grain plants, rotting the roots and blackening the base of the stem. It infests wheat, and is also known to infest oats, barley, rye and rice. The risk of introducing both the above diseases lies in the importation of any seed which could carry the spores. Therefore, under Quarantine Order No. 39, all wheat, barley, oats, rye and rice in the raw or uncleaned or unprocessed state is prohibited from entry into the United States and its Territories from India, Japan, Australia, Germany, Belgium, Great Britain, Ireland and Brazil. All persons are therefore warned not to import any of the above mentioned grains, either by freight or even in small parcels by mail, as under the regulations all such material will be seized and destroyed.

Under Quarantine Order No. 24, the Federal Horticultural Board prohibits the importation, in the raw and unmanufactured state, of seed and all other portions of Indian corn or maize (*Zea Mays*) as well as the closely related plants, including all species of *Teosinte*, Job's tears, and various others on account of the downy mildews and Physoderma diseases of Indian corn. Several small lots of corn seed have been seized and destroyed lately at the postoffice and all future importations will meet a like fate.

Intestinal Parasites in Poultry

(As many inquiries are received in the office of the Territorial Veterinarian, the following extract from Dr. B. F. Kaupp's "Diseases of Poultry" may prove of benefit to all poultry raisers in the Territory.)

"Intestinal parasites in small numbers infest all fowls without doing perceptible harm, but there is always possibility that conditions for their propagation may become so favorable as to turn the mildest infestation into devastating parasitism. Indeed, this very thing has occurred numberless times, and not a few flocks have been entirely destroyed by it. The death of any bird from the effects of internal parasites should be looked upon with apprehension.

"Flocks infested with large numbers of round worms are unprofitable in the extreme. The birds are unthrifty, appear unkempt and suffer from diarrhea and constipation. Young fowls are most severely affected.

"TREATMENT. It is necessary to keep the yard and henhouse clean, lime scattered on the floor and about the yard, and the water for the birds kept in a clean fountain and the food in clean troughs, made for the purpose and disinfected daily, and so con-

structed that birds cannot step into them. If at all possible, birds should be moved upon new ground. The parasites' eggs in the droppings removed from the henhouse may be destroyed by mixing the manure with unslaked lime.

"The birds may be given one teaspoonful of turpentine followed by a tablespoonful of olive oil. If the crop is full the dose of turpentine should be double. Five to ten-grain doses of areca nut is good treatment. The areca nut can be mixed with soft feed and fed from a clean trough; it acts as a cathartic as well as a parasiticide. One-grain doses of thymol are an excellent treatment for round worms.

"ERADICATION OF WORMS. A campaign to control the round worms of all kinds infesting the intestinal tract involves both treatment of the fowls in order to expel the worms, and disinfection and sanitation of the coops and runways to prevent infestation.

"Birds do not like mash in which there is incorporated turpentine or areca nut. Tobacco stems finely chopped and steeped in hot water for two hours and mixed with mash gives uniformly good results and is readily eaten by the fowls. Experiments in this laboratory show that badly infested birds expel large numbers of worms and upon post-mortem examination are entirely freed from the infestation. Two doses should be given three days apart. For each fifty fowls one-half pound finely-chopped tobacco stems should be used. The birds should be fed this mixture in the morning, or on an empty crop. In the evening give to each fifty fowls five ounces of epsom salts dissolved in water and this water mixed with mash. Do not give any other feed for that day. For chicks give doses in proportion to the size of the birds. This treatment will cost about one cent for each ten birds.

"The treated birds should be moved to yards and houses free from infestation. In yards where infested fowls have been kept it has been found upon microscopic examination that the soil may be infested by the eggs of the round intestinal worms to a depth of two inches below the surface. For disinfecting the yards a corrosive sublimate solution 1 to 1,000 may be used. This is applied by aid of a sprinkling can after all rubbish has been swept up and removed. One gallon of the solution should be used for each ten square feet.

"The house should be thoroughly cleansed and every square inch saturated with the corrosive sublimate solution. The litter removed from the yard and house should be hauled out and scattered on a field used for raising crops and removed from the fowls.

"Mercuric chlorid (corrosive sublimate) is poisonous, and care must be taken not to allow the birds to drink it or the food or water to become contaminated with it. After the feed and water troughs have been thoroughly scrubbed inside and out with the solution, they must be rinsed with clear water."

TEN RULES OF BEEF PRODUCTION.

First. Plenty of pasture and feed.

Second. The right kind of cows—those that will produce good calves regularly.

Third. A good, purebred registered bull—one that will sire good calves persistently.

Fourth. A large calf crop. This means that all cows shall drop calves, and that the calves shall be properly cared for at birth.

Fifth. Proper care of the breeding herd and the calves.

Sixth. Selection of good heifer calves to replace old or inferior cows.

Seventh. Prevention of disease among the breeding herd and the younger stock.

Eighth. Shelter sufficient to protect the cattle from both severe cold and extremely hot weather.

Ninth. A practical knowledge of fattening cattle for market.

Tenth. Marketing to advantage.

RARE SUGAR FOUND IN HONEY.

Although known to occur in various forms, even perhaps as one of the constituents of the manna of Scripture, melezitose is one of the rarest sugars. Minute quantities of it have been available to scientists for many years, but the supply has never been sufficient to permit of extensive experimentation. Now, by the aid of some Pennsylvania bees, many of which lost their lives, the United States Department of Agriculture has several kilograms of this rare substance, extracted and purified in the Bureau of Chemistry.

The bees in certain sections of Pennsylvania were storing up honey that crystallized, with the result that in the following winter seasons the bees were not able to digest it, and starved. The crystallized substance in the honey was found to be melezitose, which derives its name from *melez*, the French name for the larch tree, on which it was originally discovered in the form of honeydew. It also occurs in a sugary incrustation, or manna, on a leguminous tree in Persia and adjoining countries. Recently it has been found by the Bureau of Chemistry in a similar product on the Douglas fir in British Columbia. And now it has turned up in Pennsylvania, stored away in the honeycomb in numerous hives. In this instance the following origin of the substance has been worked out:

The scrub pine, and rarely other species of pine, are subject to attack by a plant louse and by a scale insect. In the course of their life activities these insects produce a honeydew which is rich in melezitose. In dry summers, after the white clover flowers have ceased to yield honey, the bees turn to this honey-

dew, and collect it; but it crystallizes as fast as they store it away. This occurred in 1917 and 1918, and considerable losses were suffered by beekeepers. In 1919 the weather was so moist during July that no melezitose was gathered by the bees at all. But it probably will be collected in future whenever the summer is dry; and the honey of central Pennsylvania may afford a permanent source of sugar previously so rare as to be only imperfectly known. The Bureau of Chemistry extracted considerable quantities from the honey of 1917 and 1918, and is making extensive experiments with it. Rare as it has always been, there is a definite demand for melezitose for use in scientific laboratories. It can be distinguished from other sugars by certain peculiarities of crystallization observable with the polarizing microscope.

Division of Forestry

Honolulu, Hawaii, January 7, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of December, 1919:

TREE PLANTING.

A few showers at Mikilua made conditions favorable for the planting out of the following trees in the Luahalei Forest Reserve: 979 red gum, 832 ironwood, 388 logwood, and 131 bloodwood, a total of 2,330 trees. At Makiki 335 koa trees were planted out.

On December 3, 60 Kauri pine trees, free of soil and with the roots packed in damp moss, were sent by mail to Hilo for planting on the boundary of the Animal Quarantine Station. These plants were seven days en route before being unpacked and were found to be in good condition.

During the month the clearing and plowing of two and one-half acres of land in the Waiahole Forest Reserve, preliminary to tree planting, was completed. On this area Kauri pine, Norfolk Island pine and Japanese cedar trees will soon be planted out under close spacing conditions in order to determine their lumber producing abilities.

According to custom, reply postcards were sent out at the end of the month to all tree planters throughout the Territory in order to obtain for the year 1919 a record of the different kinds of trees planted and the purpose of plantings.

For the celebration of Christmas, the Division of Forestry was able to furnish quite a number of Japanese cedar trees from the plantation in Makiki which was established two years ago for this special purpose.

Permission was obtained on December 5 from the Superintendent of Public Works to use non-citizen labor at the Haiku Nursery. Ranger Lindsay had had a native born Chinese laborer working at the nursery for about one month, and after he had left for higher wages, he found it impossible to secure any other labor than Japanese. After securing this permission, Ranger Lindsay transferred to our payroll the Japanese laborer who has been working for him for a great number of years and is competent to take care of the trees at the new nursery.

FOREST PROTECTION.

On December 3, with the assistance of a government surveyor, the boundary line of certain private property on Tantalus was relocated, and it was found that the Japanese keeper had encroached on government land. He was at once instructed to move his fence back to the proper boundary, and to keep his stock at home, and plans have been made to reforest with native species of trees the area in the region on which Hilo grass has made encroachments. At the same time seed of the native papala kepa, kalia and ahakea trees was secured for planting on the area in addition to koa trees, which will be planted in greater number.

During the month suitable clauses requiring certain fencing along the forest reserve boundary and the prevention of the inroads of stock were submitted to the Land Commissioner for inclusion in the new general leases of government lands of Waimea and Mokihana, Kauai.

On December 10, Entomologist Fullaway and I made a trip to Palolo crater to investigate certain field conditions. We were unable to find any trace of infestation of the Sadleria ferns by the Australian fern weevil. The native forest immediately south of the crater was found to be somewhat deteriorated, probably due to soil conditions followed up by the invasion of Hilo grass. Ten pounds of karaka tree seed were sowed in seed spots in open areas in order to form the nucleus for a new forest in this region which should eventually shade out the Hilo grass. The survey office has also been requested to furnish a map and description of the area in the higher mountain region back of Honolulu on which it is proposed to prohibit human trespass in order to give the native forest the fullest protection possible.

Plans have been made to repair certain existing fences and to build a stretch of new fence on the boundary of the Kulioou Reserve in order to give the remaining native forest full protection from the inroads of stock from neighboring ranches.

District Fire Warden A. Menefoglio reports that on November 29 a fire started along the ditch trail in Wainiha Valley, Kauai, and although it burned a considerable area of staghorn fern, no great damage was done to the forest.

During the month an inspection was also made of the forest reserve lands in Aiea, Oahu, where the forest was found to be in good condition, although rather dry. Observations were made for infestation of ferns by the Australian fern weevil, but no trace of the weevil could be found and the Sadleria ferns in this region are in a very healthy condition.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit a report of the work done during the month of December, 1919:

NURSERY.

Distribution of plants:

Sold	21 plants
Gratis	1,015 "

Total 1,036 plants

COLLECTIONS.

Government Realizations:

Plants Sold	\$ 22.90
Rent of Office Building, Nursery Grounds, for November.....	35.00
Refund on payment of wages of Chong Kui, Haiku, Mani....	3.23
Refund on return of anthrax serum by H. K. Mulford & Co., Philadelphia	123.33
Total	<u>\$184.46</u>

Preservation of Forest Reserves:

78 loads of black sand from Makiki Valley sand pit..... \$ 39.00

Camp Site Fees:

Camp Site No. 34, Kokee Camps, Kauai, Jan. 1 to Dec.
31, 1920 8.00

Rents and Fees:

Minota, rent of premises at Half Way House, Tantalus..... 30.00
 Fee for land and gathering ti leaves, Kalawahini, Paoa Val-
 ley, quarter ending December 31, 1919..... 12.50

\$ 89.50

PLANTATION COMPANIES AND OTHER CORPORATIONS.

Under this heading the distribution of plants amounted to 101,000 seedlings and 1,000 pot grown. We have about 100,000 more ordered and those we expect to have ready about the beginning of February.

MAKIKI STATION.

The work at this station has been principally routine. A good supply of trees are on hand and we are adding to our stock.

HONOLULU WATERSHED.

During the month 335 koa trees were planted in Opu Valley. Other work consisted of clearing off and making holes.

ADVICE AND ASSISTANCE.

The writer has made a number of visits to Fort Ruger and also to Fort De Russy for the purpose of giving advice in planting, etc.

Other visits made at the request of people in and around the city were as follows: Visits made, 9; advice by telephone, 8; advice to people calling, 9.

Respectfully submitted.

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, Hawaii, January 3, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of December the insectary handled 14,900 pupae of the melon fly, from which there were bred 1,724 females and 1,301 males, *Opius fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opius fletcheri

Oahu:		Females.	Males.
Wahiawa	1,210		1,080

FRUIT FLY PARASITES.

Diachasma fullawayi.

Oahu:			
Kalihi	150		130
Wyllie Street	10		10
Nuuanu Avenue	70		40

Galesus silvestri.

Oahu:		
Nuuanu Avenue	600	

Diachasma tryoni.

Oahu:			
Kalihi	800		650
Wyllie Street	200		200
Nuuanu Avenue	150		150

Tetrastichus giffardianus.

Oahu:		
Kalihi	2,500	
Nuuanu Avenue	800	
Wyllie Street	1,000	

Opius humilis.

Oahu:		
Kalihi	300	250

Dirhinus giffardi.

Oahu:		
Nuuanu Avenue	360	

CORN LEAF HOPPER PARASITE.

Paranagrus osborni.

Oahu:		
Makiki Nursery	1,800	
Kaimuki	200	

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, Hawaii, December 31, 1919.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of December, 1919, as follows:

During the month 67 vessels arrived at the port of Honolulu, 26 of which carried vegetable matter, and 9 vessels came through the Panama Canal. The following disposal was made of the various shipments:

Passed as free from pests	1,209 lots	25,200 pkgs.
Burned	102 "	102 "
Fumigated	6 "	6 "
Returned	4 "	4 "
Total Inspected	<u>1,321</u> lots	<u>25,312</u> pkgs.

Of these shipments 25,011 packages arrived as freight, 141 packages as mail and 160 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 1,003 bags of rice from Japan, 260 mats of rice from China and 2,374 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 5,960 pieces of baggage belonging to immigrants from foreign countries were examined, from which 55 lots of fruit and 30 lots of vegetables were seized and destroyed.

On December 2 a package of rice seeds found in the mail from Japan was seized and destroyed, being prohibited.

On December 6, per Persia Maru, 3 plants were found in the baggage of an immigrant from Japan. These were seized and destroyed.

On December 10 a package of corn found in the mail from Japan was seized and destroyed. A package of chestnuts was fumigated as a precaution.

On December 21, per Nippon Maru, a package of chestnuts found in the baggage of an immigrant from Japan was seized and destroyed on account of being infested with weevils. Four plants belonging to a passenger were returned on board the steamer. Two packages of rice seeds and a package of iris roots were found in the mail from Japan and these were destroyed, being prohibited under Quarantine Order No. 37 of the Federal Horticultural Board.

On December 22, per Korea Maru, 2 packages of pili nuts found in the baggage of immigrants from Manila were seized and destroyed.

On the same date, per Venezuela, a package of pili nuts found in the baggage of a passenger from Manila was seized and destroyed. A package of wistaria seeds, a package of bulbs, a small bag of barley and a package of herbs, all in the mail from Japan, were seized and destroyed, being prohibited. Two packages of seeds from India for the Board of Agriculture were fumigated and passed; a package of vegetable seeds, a package of chestnuts and a package of taro for food from Japan were fumigated and passed.

On December 23, a box of orchids brought in the baggage of a passenger

from Sydney, N. S. W., was seized and destroyed under Quarantine Order No. 37 of the Federal Horticultural Board.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of seven steamers at the port of Hilo. Three carried vegetable matter, consisting of 60 lots and 3226 parcels, all passed.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of eight vessels at the port of Kahului. One carried vegetable matter, consisting of 10 lots and 1004 parcels. These were all passed excepting one plant in soil. This was returned on board.

INTER-ISLAND INSPECTION.

Sixty steamers plying between Honolulu and the other Island ports were attended and the following shipments passed as free from pests:

Taro	709 bags
Fruit	235 packages
Vegetables	549 "
Plants	138 "
Seeds	21 "
Pineapple shoots	5430 bags
Sugar cane	21 packages
Total passed	7103 packages

Sixteen pots of plants and one package of sugar cane were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, Hawaii, January 13, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to submit herewith my report on the work of the Division of Animal Industry for the month of December, 1919.

IMPORTATIONS OF LIVE STOCK.

On December 4th the S. S. Lurline arrived here with the following live stock on board:

3 jacks, Parker Ranch, Hawaii; 1 stallion, Brewer & Co.; 2 bulls (Durham), O. R. & L. Co.; 1 bull (Jersey), J. H. Peterson; 18 bulls (Herefords), 2 heifers (Herefords), Dr. Raymond; 12 cows (Holstein), Chas. Lucas; 1 bull (Holstein), College of Hawaii; 5 cows (Ayrshire), Harold Rice; 16 mules, Schuman Carriage Co.; 1 dog (collie), M. Nicol; 15 coops chickens, S. I. Shaw and others.

Of all these consignments of live stock, only one (the 18 bulls and 2 heifers for Dr. Raymond) was accompanied by the requisite health certificates. The attention of the agents of the Matson Navigation Company was called to this fact, and they were reminded that during the year 1919 hardly any shipment of live stock arrived by the Matson boats at either Hilo or Honolulu accompanied by the proper papers. In spite of this, an attempt was made to bring a dog ashore from the S. S. Maui, which arrived here on the 19th of December. This dog was being carried ashore in a covered basket by a room steward, and, even though the purser had furnished the inspecting officer with a list of the live stock on board, this dog did not appear on the list. The dog was apprehended by our Live Stock Inspector and was taken to the quarantine station.

In order to straighten out this lack of co-operation on the part of the Matson Navigation Company, I have requested the local agents to furnish me transportation from Honolulu to San Francisco and return. In case this request is complied with I shall, with the Board's permission, endeavor to bring the Federal Bureau of Animal Industry inspectors in San Francisco, as well as the inspectors from the state veterinarian's office, into conference with the Matson Navigation Company with a view to evolving some system that will insure that the rules and regulations of this Board be complied with in the future.

INFECTIOUS DISEASES OF LIVE STOCK.

Two outbreaks of hemorrhagic septicemia in hogs have been reported from Maui. Both outbreaks were brought under control by means of the swine plague bacterins and the necrobacillosis powder which were provided through the animal industry revolving fund.

An outbreak of cerebro-spinal meningitis was reported from the Island of Molokai. Seven mules and one horse died. This disease, the nature of which is unknown, has recently caused considerable losses on both Hawaii and Maui, and, unfortunately, we are unable to provide any treatment beyond a change of feed and, if possible, removal from the infected pastures to higher grounds.

TUBERCULOSIS CONTROL.

From the appended report of the Assistant Territorial Veterinarian, it will be seen that during the past month 143 head of cattle were tested, out of which number 3 were condemned.

The recommendation of Dr. Case in regard to the manner of dealing with the Wailupe herd is approved. The complete extermination of this herd would undoubtedly prove the most economical way of dealing with it and thereby put a stop to the spread of infection to neighboring herds.

On December 11, the following wireless message was sent to the Chief of the Federal Bureau of Animal Industry at Washington, D. C.:

"Is Federal indemnification to form part of total territorial indemnification or additional thereto. If part can Territorial pay full amount to owner and collect difference from you upon vouchers made out favor Territorial Board of Agriculture and Forestry? Cable reply.

"NORGAARD."

Up to this date no reply has been received. The opinion of the Attorney General, to the effect that the Federal indemnification for cattle condemned on account of tuberculosis should be in addition to the indemnification paid by the Territory and should not form part of the Territorial indemnification, is herewith appended.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Hawaii, January 10, 1920.

Dr. Victor A. Norgaard, Chief, Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu.

Sir:—I have the honor to submit the following report for the month of December, 1919:

TUBERCULOSIS CONTROL.

During the month of December the following cattle were tested:

	Tested.	Passed.	Con- demned.
Dr. J. H. Raymond	20	20	0
Fred Luning	8	8	0
C. W. Lucas	4	4	0
J. H. Peterson	1	1	0
O. R. & L. Co.	2	2	0
College of Hawaii	1	1	0
S. M. Damon	80	79	1
Fred Luning	1	1	0
S. M. Damon	27	25	2

The above tabulated list totals 143 head, out of which number 140 were passed and 3 condemned and branded.

Besides the above, post-mortem examinations were made at the slaughter house on 54 head of condemned cattle. Of these, 52 head came from the Wailupe Ranch, and were found to be so badly affected with tuberculosis that 7, or 13.4 per cent, had to be condemned entire as being unfit for human consumption.

It is my opinion that this ranch has formed a center of infection for many years, and it is due to the large percentage of disease there that our efforts at eradicating tuberculosis from that section of the Territory have been largely unsuccessful.

All efforts must be made to eradicate this center of infection, either by eliminating the entire herd at once, and this method is to be preferred as being less expensive to all parties concerned, or tests of the *entire* herd at three-month intervals.

IMPORTATIONS OF LIVE STOCK.

A total of 52 vessels were boarded by the Live Stock Inspector during the past month, of which the following were found to carry live stock for this Territory:

S. S. West Cawthon, San Francisco: 2 horses, Alexander & Baldwin; 1 Berkshire boar, College of Hawaii; 14 cts. poultry.

S. S. Lurline, San Francisco: 3 jacks, Parker Ranch; 1 stallion, C. Brewer & Co.; 2 Durham bulls, O. R. & L. Co.; 1 Jersey bull, J. H. Peterson; 18 Hereford bulls, 2 Hereford heifers, Dr. J. H. Raymond; 12 Holstein cows, C. W. Lucas; 1 Holstein bull, College of Hawaii; 4 Ayrshire cows, Harold Rice; 16 mules, Schuman Carriage Co.; 1 collie, M. Nicol; 15 cts. poultry.

S. S. Sachem, San Francisco: 17 cts. poultry

S. S. Manoa, San Francisco: 54 cts. poultry.

S. S. Maui, San Francisco: 17 cts. poultry, 1 German collie, R. W. Atkinson.

S. S. Hyades, San Francisco: 17 cts. poultry.

S. S. Korea Maru, Orient: 1 Japanese spaniel, Dr. E. C. Waterhouse;
1 Japanese spaniel, T. Sasaki.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEEDLINGS FOR SALE AT GOVERNMENT NURSERIES.

The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papapaholahola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. (Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

HILO, HAWAII. Nursery at the Boys' Catholic School in charge of Bro. Matthias Newell, Hilo.

PRICES: Plants in seed boxes \$1.00 per 1000. Transplants in boxes 1c each. Transplants in pots 2½c each.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, MARCH, 1920.

NO. 3

During January there were distributed from the Government Nursery in Honolulu a total of 72,324 trees of various species for planting on the Island of Oahu.

The attention of shippers of dairy cattle is called to the new rule of this Board—"Rule XIV", Division of Animal Industry"—which appears in this issue.

The prolonged dry spell has rendered the native forest growth in the mountains very inflammable and it behooves everyone traveling in the woods or over grass lands to use the greatest precaution, so as not to start any fires.

In the tuberculin test for January, only eight head of dairy cattle, out of a total of 430 head, were found to be infected with bovine tuberculosis and were condemned by the Territorial Veterinarian.

It is hoped that the controllers of the upper forest lands of Kahuku, Oahu, will take early steps toward the protection of the remaining native forest in that region, which is very important in the scheme of water conservation.

Among the trees planted out by the Division of Forestry during January, there were 490 kauri pines, the valuable timber trees from New Zealand. These were set out 10 by 10 feet apart at Waiahole in plantation formation.

The attention of those who are interested in the planting of a timber tree of real value is called to the special article in this issue on the Australian red cedar, which already shows good promise in this Territory.

Of a total of 57 vessels touching at Honolulu during January, only 20 carried vegetable matter, consisting of 12,152 packages. Of these, 121 packages were, upon inspection, found to be infested or imported contrary to regulation, and were either burned, fumigated, or returned by the Plant Inspector.

In order to prevent the further spread of certain insect and plant pests in this Territory, a new rule of this Board—"Rule XXI—Division of Plant Inspection"—was recently approved by the Acting Governor and appears on the By Authority page of this issue.

The protection of one more forest reserve on Oahu from the ravages of stock was completed during January by the repairing of old fences and the building of a stretch of new fence on the boundaries of the Kuliouou Forest Reserve at the eastern end of the island. A total fence length of 1.82 miles was thus made stock-proof.

Hawaii has no snakes and fortunately has very few poisonous plants, so that one may tramp in the hills with unhampered pleasure. There are certain plants and fruits, however, which are poisonous, and for this reason it is well for the stranger to refrain from tasting or handling the fruit or leaves of unfamiliar plants. One common mistake is for the newcomer to eat raw kukui nuts, and the eating of a few raw castor oil beans has lately resulted in a fatality. In order to help those who are unfamiliar to recognize the plants that should be avoided, there is printed in this issue a brief article by Consulting Botanist J. F. Rock on the more common poisonous plants, both native and introduced, found growing in these islands.

New Animal Industry Rule

The Board of Commissioners of Agriculture and Forestry on February 11, 1920, adopted a new rule, known as "Rule XIV—Division of Animal Industry," which was needed to prevent the further spread of bovine tuberculosis by the inter-island shipment of untested dairy cattle.

The reasons for adopting this new rule are fully set forth in the Territorial Veterinarian's report for January. This rule received the approval of the Governor of the Territory on February 25, and is printed on the By Authority page of this issue.

New Plant Inspection Rule

On February 11, 1920, the Board of Commissioners of Agriculture and Forestry adopted a new rule, known as "Rule XXI—Division of Plant Inspection," to prevent the further spread of certain known insect and plant pests. This new rule, which appears on the By Authority page of this issue, received the approval of the Acting Governor on February 25, and has since been published.

The necessity of such a rule was forcibly brought to the attention of the Commissioners by the recent discovery of an infestation of the Australian fern weevil in a new region on the island of Hawaii. This weevil had evidently been carried for almost 30 miles on some form of fern plant to this new region. This shows how readily undesirable insects which are destructive to forest growth may unintentionally be disseminated. The aim of this rule is to prevent the further spread of such pests.

The letter of transmission presenting this rule to the Board for adoption follows:

February 7, 1920.

*Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

Gentlemen:—The attached rule concerning the control of certain insect and plant pests is respectfully presented for your consideration.

This rule is intended primarily to prevent the carrying of the recently discovered pest on the white ginger plant and the carrying of the Australian fern weevil from one locality to another throughout the Territory. It also includes a prohibition against the carrying of Spanish moss from one locality to another, and it is deemed advisable to place this prohibition on Spanish moss in lieu of the more drastic action of destroying all Spanish moss in the Territory, which it was intended to take in 1918, but which the Attorney General ruled could not be taken unless Spanish moss had actually proved to be a menace in this Territory.

Provision is made in this rule for exceptions in case it might possibly be determined that some of the prohibited articles might, under certain circumstances, be transported from one part of the Territory to another.

Chief Plant Inspector Ehrhorn and Entomologist Fullaway concur in this proposed rule.

Very respectfully,

C. S. JUDD,
Executive Officer.

The Australian Red Cedar

By C. S. Judd, *Superintendent of Forestry.*

One of the most promising of recently-introduced timber trees in Hawaii is the Australian red cedar, *Cedrela australis*, which has not the appearance of the usual cedar tree, as we know it, but which resembles the black walnut tree. It belongs to the same family as the Spanish cedar, which produces the fragrant wood with a cedar odor, and from which cigar boxes are made.

This cedar is a native of eastern Australia and is found in scattered belts on the volcanic soils and in the warmer localities

of Queensland and New South Wales, where the annual rainfall is over forty inches. There it does not form pure stands but is found mixed with other trees in the high forest over a dense underwood.

The tree coppices freely and vigorously and may be raised from cuttings without difficulty. It bears heavy crops of seed, usually every two years, and these being very light and winged, are readily distributed by the wind. One pound of red cedar seed contains about 70,000 seeds. This feature makes the tree particularly suitable for areas in Hawaii where it is desired to secure an extension of the forest by natural reproduction. The seed requires full sunshine for germination, and being intolerant of shade it will not grow under other trees. The power of the seed to germinate is not retained over a lengthy period and the seed must therefore be sown soon after it is harvested.

The seed, when fresh, has a very high percentage of germination, however, and the young seedlings exhibit very rapid growth, develop a strong root system and are very amenable to nursery treatment.

The Australian red cedar tree, shown in the accompanying illustration, is growing on Tantalus and is 30 feet high and $4\frac{1}{4}$ inches in diameter at breast height, $23\frac{1}{4}$ years from planting. Red cedar trees at Koloa, Kauai, have grown just as rapidly as neighboring eucalyptus trees, but have a larger stem diameter. In its native habitat the red cedar shows an average diameter growth of one inch per year over a period of 200 years and will attain a total height of 200 feet, a clear bole length of 100 feet, and a maximum diameter of over 10 feet.

The chief value of this red cedar is for its wood, which is very similar to mahogany but lighter. It is prized very highly in Australia for use in furniture and piano making, turnery, boat building, window blind frames, carriage and general house construction. It seasons well, is durable, is immune from boring insects, and is susceptible of a high polish. It is especially valued for the making of racing boat shells on account of its light weight and strength, and choice veneers are cut from the junction of the branches with the stem. The bark contains a considerable quantity of tannin, which produces a purplish leather.

The Australian red cedar, on account of its ease of propagation, rapid growth, and valuable wood products, gives great promise as one of the future timber-producing trees in the Territory of Hawaii. Fortunately, much progress has already been made toward its establishment in these islands. To Mr. E. C. Smith of Honolulu, who was familiar with the tree in his native country, must be given the credit for the introduction of the red cedar to these islands. In 1914 he imported 200 of the trees from Australia and these were planted at Kunia in Honouliuli, Oahu, in a region of very scanty rainfall. These were cultivated and cared for by the Kunia Development Company, under



Australian Red Cedar on Tantalus Ridge, Honolulu.

the direction of Mr. A. W. Van Valkenburg, and have shown excellent growth in the comparatively arid region where the irregular rainfall averages only about 30 inches a year.

Through the kind offices of the two above-mentioned gentlemen, a quantity of seed of the Australian red cedar was obtained in 1916 from Australia, and from these 25,000 seedlings were raised at the Government Nursery and distributed in February, 1917, to 20 interested tree planters on the six main islands of the group. In two or three years from now these trees should begin to bear seed, by the use of which the planting of this tree may be extended.

During the fall of 1919, the Forest Nurseryman secured a quantity of seed from one of the cedar trees planted at Kunia and which was only five years old. From this seed 13,000 seedlings have been raised and distributed for planting in different parts of Oahu. As soon as other red cedar trees are in bearing, additional quantities of seed will be sent out to the other islands for planting.

The Australian red cedar is recommended to any tree planter in the Territory who desires to establish a rapidly growing tree which has already been proved to grow well in this climate and which will yield him valuable lumber and other timber products.

The Poisonous Plants of Hawaii

By J. F. Rock, *Consulting Botanist.*

The recording of the poisonous plants of the Hawaiian Islands is not a difficult task as, fortunately, the number of such plants is very small, and were it not for more or less recent introductions, the number would be still smaller.

Owing to the death of a soldier, which occurred recently and which was due to the effects of eating six castor beans, it was thought wise to publish a brief article on the few poisonous plants existing in the Territory, in order to prevent or warn people from either picking or thoughtlessly chewing or eating them.

The native poisonous plants are very few in number and may be enumerated as follows:

The first three species mentioned are practically the only native poisonous plants; to them must be added the kukui or candle-nut tree. All the others are of early or recent accidental introduction.

AKIA (*Wikstroemia* spp.)

The genus *Wikstroemia* is an Asiatic one and is represented in the Hawaiian Islands by species which are usually found in the outskirts of the forests and dry open localities. Only two

or three, or possibly four, of which one represents perhaps an undescribed species, occur in the wet regions or rain forests. They are more or less easily recognized by the dull olive green foliage which is, however, quite variable in the different species, by the tomato-red drupes, which are oval and about a fourth of an inch long, and by the black bark, which is a very strong and unbreakable bast. Branches of these species cannot readily be broken off, but when broken the bark will peel off the stem or branch, leaving the white sap-wood exposed. The bark has a disagreeable odor and stains the hand green.

The Akia, as the natives call these species, was employed by them as a fish poison, similar to Auhuhu or HOLA. Apparently all parts of the plant are poisonous and contain a narcotic.

AUHUHU or HOLA (*Trephrosia piscatoria*).

The Auhuhu is a small leguminous plant with white flowers and small pods. It grows erect in pasture lands, especially in very dry situations near the sea on old lava flows, as on the west end of Molokai, at Koko and Diamond Head, and in the lower Waianae Mountains on Oahu and in dry situations on the lee-side of all islands. It is poisonous to stock and was used by the natives to stupefy fish. It contains a glucoside known as tephrosin $C_{31}H_{26}O_{10}$ and perhaps also tephrosal $C_{10}H_{16}O$, which is toxic, especially to fish.

KIKANIA also POPOLO (*Solanum aculeatissimum*).

This Kikania or Popolo is not very common but is usually found in the lower forests and in scrub vegetation of the lowlands of all islands. It is a spiny plant, belonging to the potato family, with whitish flowers and bright scarlet fruit an inch or more in diameter. The fruit is poisonous, not to the touch, but if eaten.

KIKANIA (*Solanum sodomium*) or Apple of Sodom.

This species is very similar to the foregoing one but occurs in waste places only; it is a shrub up to four feet in height, of a globose outline; it is very spiny, has purplish pale flowers and bright yellow, apple-like fruits of over an inch in diameter. The fruit is quite poisonous.

COMMON NIGHTSHADE (*Solanum nigrum*).

This Popolo, which is more or less common in the lowlands, is usually found as a weed only a foot or so in height. The flowers are small and white and the small berries black and shining. The fruits are sometimes used for pies and preserves. It should, however, be used with caution and should never be used or eaten, if at all, until thoroughly ripe. Cases of poisoning have been recorded for calves, sheep and swine.

The plant contains an alkaloid solanin $C_{32}H_{47}NO_{18}$, which is

present in larger quantities in the fruit before it is entirely ripe. Solanidin $C_{30}H_{61}NO_2$ is also present. The symptoms are stupefaction, staggering, loss of speech, cramps and sometimes convulsions. Death is due to paralysis of the lungs, but few cases are fatal.

POPOLO (*Solanum trifolium*)

This species is much more common than the foregoing, but is also confined to the lowlands. It is an annual weed with small whitish flowers and greenish black fruits (small berries). The berries are poisonous but no cases of human poisoning have been recorded.

JIMSON WEED or THORN APPLES (*Datura stramonium*)

A rank-scented, tall, narcotic herb with spiny ovoid-pointed capsules and tubular-funnel-shaped purplish flowers. The seeds of this plant are exceedingly poisonous and prove invariably fatal when eaten. The alkaloids are atropin and hyoscyamin, the active principle of belladonna. Persons have been poisoned by sucking the flowers or eating the seeds. The symptoms are nausea, dry, burning skin, dilated pupil, loss of sight, mania, convulsions and death. Vomiting is not a common symptom. The thorn apple occurs in waste places all over Honolulu and makes its appearance usually after or during the winter rains; it is found on all islands. Mention may also be made of *Datura suaveolens* and *Datura arborea*; both species are known in Hawaii as Angel's Trumpet. The large white pendant flowers make them conspicuous and both species are poisonous.

CASTOR OIL BEAN (*Ricinus communis*).

The well-known castor oil plant is very common about Honolulu, especially in waste places. The seeds furnish the well-known castor oil, a mild and safe purgative when refined. The seeds contain 50% of oil and an acrid poisonous substance, and three seeds have been known to cause death in man. The seeds are ten times more purgative than the oil. Recently, in Honolulu, a soldier died a few days after having eaten six seeds of this plant. The oil is not poisonous, but the pulp contains an acrid albuminous substance called *ricin* $C_8H_8N_2O_2$. The seeds have also caused death in horses.

POINSETTIA (*Euphorbia pulcherrima*).

The Poinsettia is also very poisonous, especially the latex or juice, and gardeners have often been severely poisoned while cutting the plants and handling them. A child is said to have died on Kauai, due to poisoning caused by sucking freshly cut stems of the Poinsettia.

KUKUI (*Aleurites moluccana*).

The Kukui, a well-known tree and easily recognized by its

very pale foliage and white to cream-colored flowers arranged in panicles, and large nuts, occurs on all the islands and forms often pure stands in the lowlands or lower forest zone. The nut when eaten raw acts as a strong purgative and contains poisonous properties and should not be eaten. The kernel, when roasted, is used as a relish by the Hawaiians, but not more than half a nut or less should be eaten. If eaten in quantity, or even a few raw nuts, poisoning symptoms will appear.

YELLOW OLEANDER or BE-STILL TREE

(*Thevetia neriifolia*).

The Yellow Oleander is commonly planted near dwellings and resembles somewhat the Oleander on account of the narrow leaves. The flowers are funnel-shaped, yellow and fragrant, the odor reminding one of tuberose. The fruits are somewhat triangular and black when ripe. It is exceedingly poisonous, as it contains a powerful heart-poison, known as thevetin $C_{34}H_{48}O_2$ and also theveresin. The milky juice is highly poisonous; the bark is a powerful febrifuge and acts also as an acrid purgative and emetic.

OLEANDER (*Nerium indicum*).

The Oleander contains poisonous properties in all its parts; the odor of its flowers is also poisonous. It is a heart stimulant and acts like *Digitalis*. Stock and horses have been poisoned by eating the leaves; the amount necessary to cause death in horses ranges from 15 to 20 gm. of green leaves and more of dry leaves. In cows even a less amount is sufficient to cause death. The symptoms are a powerful heart stimulation which causes profuse perspiration, soreness of mouth and throat, the bowels act often, and death ensues usually in about twenty-four hours.

Division of Forestry

Honolulu, February 6, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of January, 1920:

TREE PLANTING.

During January 285 koa trees were set out on the Makiki watershed and on the newly cleared area in the Waiahole Forest Reserve 490 kauri pine and 100 Japanese cedar seedlings were planted, making a total of 875 trees planted out during the month.

FOREST FENCE.

The boundaries of the Kulouou Forest Reserve, near the eastern end of Oahu, received attention during the month. This is a reserve of only

214 acres of government land, but it is important as an outpost of the forest on the Koolau Range to the west, and for this reason should receive the best possible protection from the ravages of stock, especially in view of the fact that it is somewhat exposed to the strong trade winds. Wild goats from the Waimanalo pali have in the past encroached on this reserve, but these have been largely killed or driven away from the reserve by constant hunting and very few now remain. Owing to breaks in the fences tame cattle from the adjacent ranches have also encroached on the reserve, but this is now impossible because the existing fences on the boundaries of adjacent lands, amounting to 1.42 miles, are now in stock-proof condition, and because of the construction of a new fence .40 mile long across the bottom of the valley adjacent to vacant public land. The Maunalua Ranch Co. cooperated in the repair of the fence on the Maunalua boundary and along the new fence a triple row of red gum trees was planted after the 14 head of cattle at large in the reserve had been driven out.

HAWAII TRIP.

One-half of the month was spent on Hawaii, as reported elsewhere, on the work of controlling the fern weevil at 29 Miles, in order to prevent its encroachment on the neighboring forest, and on the work of beginning the investigation of the infestation in and about Hilo. Negotiations were also begun for the construction of additional fencing along the volcano road in cooperation with the owner of adjacent private land.

FOREST PROTECTION.

At the request of Mr. Sorenson of the O. R. & L. Co., I supplied him, after a check field trip to Kahuku on January 7, with the approximate location of a line across the upper lands of Kahuku, recommended by my predecessor in 1910, as the proper line on which a fence should be constructed for the protection of the important forest cover on the mountains in this region.

FOREST FIRE.

On the night of January 25, a fire in Halawa was reported to me by telephone and I at once communicated with Fire Warden James Gibb of Aiea, who assured me that it was only a grass fire on a ridge which would burn out as soon as it reached the damper vegetation. This proved to be the case, for on inspecting the area the next morning the fire was completely out. It burned over approximately 25 acres of steep open grass land between the pineapples and the forest.

Respectfully submitted.

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, February 5, 1920.
Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit a report of the work done during the month of January, 1920.

NURSERY.

Distribution of Plants—

	Transplants.	Pot-grown.	Total.
Sold	150	45	196
Gratis (including Forest Reserves) ..	786	342	1,128
Total	936	387	1,324

COLLECTIONS.

Government Realizations—

On account of sale of plants	\$ 2.90
Rent of Office, Nursery Grounds for December, 1919	35.00
Total	\$37.90

Forestry and Forest Reserves, Preservation and Extension—

Kokee Camp Sites, Na Pali-Kona Forest Reserve, Kauai,
Fees from 19 camp site holders, amounting to a total of \$344.00
(Covering a period from January 1 to December 31, 1920.)

PLANTATION COMPANIES AND OTHER CORPORATIONS.

The distribution of plants under this heading amounted to 11,000 in transplant boxes and 60,000 in seed boxes, a total of 71,000.

MAKIKI STATION.

We have installed at Makiki Station the "Skinner System" of irrigation. This system is working very satisfactorily and we find that the small cost of installing it will, in a short time, remunerate us many times over, when we consider that there is much less labor required in doing the irrigation and this system does away entirely with the rubber hose.

Other work done at this station has been principally routine.

HONOLULU WATERSHED PLANTING.

We have planted during the month in and around Opu Valley 285 koa trees. Other work consisted of hoeing and clearing, and clearing trails.

ADVICE AND ASSISTANCE.

The writer has called at the different military posts around Honolulu, at the request of the officers in charge, for the purpose of giving advice in planting, etc.

Other advice given was as follows:

Calls made	6
Advice given by phone	5
Advice given to people calling	8

Respectfully submitted.

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, February 3, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of January the insectary handled 19,300 pupae of the melon fly, from which there were bred 3,861 females and 2,790 males, *Opius fletcheri*.

The distribution of parasites was as follows:

Opius fletcheri.

Oahu:		
	Females.	Males.
Moanalua	1,610	1,435
Moiliili	580	520

Diachasma tryoni.

Waikiki	100	100
Palama	50	50
Kalihi Valley	350	300
Maui:		
Kula	200	200

Diachasma fullawayi.

Oahu:		
Waikiki	30	30
Kalihi Valley	75	75
Maui:		
Kula	20	20

Opius humilis.

Oahu:		
Waikiki	50	50
Kalihi Valley	100	100
Maui:		
Kula	50	50

Dirhinus giffardi.

Oahu:		
Nuuuanu		100

Galesus silvestri.

Oahu:		
Nuuuanu		2,000

Tetrastichus giffardianus.

Oahu:		
Waikiki		500
Palama		100
Kalihi Valley		2,100
Maui:		
Kula		200

Paranagrus osborni.

Oahu:

Makiki Nursery 1,200

Respectfully submitted.

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, January 31, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of January, 1920, as follows:

During the month 57 vessels arrived at the Port of Honolulu, 20 of which carried vegetable matter and 9 vessels came through the Panama Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	638 lots	12,031
Burned	70 "	70
Fumigated	9 "	36
Returned	7 "	15

Total Inspected	724 "	12,152 "
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Of these shipments 11,897 packages arrived as freight, 135 packages as mail and 120 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 235 mats of rice from China and 1395 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 3330 pieces of baggage belonging to immigrants from foreign countries were examined, from which 43 lots of fruit and 19 lots of vegetables were seized and destroyed.

On January 7, per Tenyo Maru, two plants found in the baggage of immigrants from Japan and China were seized; one was returned on board the steamer, the other was destroyed. One lot of seeds in the baggage of a passenger from China was seized and destroyed. In the mail was found a package of barley, a package of wheat and a package of rice seed, all from Japan. These were seized and destroyed, being prohibited under Quarantine Order No. 39, of the Federal Horticultural Board. A package containing a lemon and a piece of horseradish was also found in the mail from Japan and destroyed. Three bags of beans and a bag of chestnuts in the mail from Japan were fumigated as a precaution.

On January 15, per Nile, a package of nuts and a package of beans in the mail from Japan were fumigated as a precaution.

On January 20, per Ecuador, 30 baskets of caladiums in the cargo from China were found infested with aphids and fumigated.

On January 27, per Ventura, 9 coconuts found in the baggage of a passenger from the Colonies were returned on board the steamer. These had sprouted and were therefore classified as plants. A potato found in the mail from New Zealand was seized and destroyed, as it appeared to be diseased.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of four steamers at Hilo. Two steamers carried vegetable matter, consisting of 53 lots and 882 parcels, all passed as free from insect pests.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at the Port of Kahului, reports the arrival of 7 vessels. Three steamers carried vegetable matter, consisting of 12 lots and 1008 parcels, all being found free from infestation.

INTER-ISLAND INSPECTION.

Fifty-eight steamers plying between Honolulu and the other island ports were attended and the following shipments passed as free from infestation:

Taro	583 bags
Vegetables	351 packages
Fruit	159 "
Plants	80 "
Seed	22 "
Sugar Cane tassels	3 bags

Total Passed 1198 packages

Six packages of plants and ferns were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, February 6, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to submit herewith my report on the work of the Division of Animal Industry for the month of January, 1920:

A wireless was received from the Deputy Territorial Veterinarian on Maui on January 2nd, stating that "black leg" had broken out among the thoroughbred cattle in the Makawao district and requesting my presence there. Under authorization of the President of the Board, I left the same evening for Kahului and found upon my arrival that one pure-bred Hereford heifer and one steer had died. A post-mortem examination was made on the heifer, which had only been dead for a few hours, with the following results: The carcass, which was in first-class condition, was considerably swollen, especially along the under side of the neck, the breast and the fore legs. The swelling was edematous and contained considerable amount of air bubbles.

Upon incision, the muscles were found to be discolored, in places being purple or nearly black, and in others of pink to red shade. The blood was very dark but well coagulated. The internal organs presented the characteristic symptoms of hemorrhagic septicemia, the lungs especially being very hemorrhagic and the lymph glands being swollen and discolored and surrounded by gelatinous exudations. The spleen was not enlarged.

As a result of these observations the diagnosis of hemorrhagic septicemia combined with malignant edema was made. The carcass was burned and every precaution taken to destroy the infection in the stables and in the yard where the sick animals had been kept.

The vaccination with hemorrhagic septicemia bacterins was recommended and, up to the present writing, no further cases have occurred.

On January 22, Dr. Case reported that while testing a large dairy herd of cattle at Wahiawa, he found three reactors, all being cows which had been purchased in South Kona about six weeks previous. One of these animals when butchered was found so badly affected with tuberculosis that the entire carcass had to be condemned. As the herd in question has been free of tuberculosis for a number of years, it is, of course, unfortunate that the disease should have been introduced again with these Kona cows; and it is recommended that a regulation be promulgated prohibiting the shipment of dairy cattle from one island to another unless they come from clean herds or else have been tuberculin tested previous to shipment.

A considerable number of cows come to Honolulu from South Kona, but, up to this time, very few reactors, in fact not more than half a dozen, have been found among them. The present case, however, of three cows all being badly affected, would seem to indicate that the ranch from which they came must be very badly infected, and steps were taken without delay to have the Deputy Territorial Veterinarian for that district begin testing the said herd and, in fact, to give as much of his time as possible to the testing of all dairy herds in that district.

A copy of the proposed regulation is herewith submitted for the approval of the Board.

Very respectfully,

V. A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, January 31, 1920.

Dr. V. A. Norgaard, Chief, Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I have the honor to submit the following report for the month of January, 1920:

TUBERCULOSIS CONTROL.

The following cattle have been tested during the past month:

	Tested.	Passed.	Con- demned.
J. T. Waterhouse	1	1	0
Kualoa Ranch	278	273	5
Miss F. Johnson	2	2	0
John Schwenck	6	6	0
P. A. Ornellas	15	15	0
K. Murakamia	16	16	0
Kemoo Farm	5	2	3
Geo. E. Newman	1	1	0
James Gibb	11	11	0
R. McKeague	5	5	0
K. Toyama	17	17	0
A. L. C. Atkinson	22	22	0
Frank de Mello	20	20	0
S. Saito	9	9	0
L. Rodrigues	2	2	0
Jose de Santiago	1	1	0
Miguel Leina	2	2	0

Jose Silva	3	3	0
John Vasconcellas	1	1	0
Jules Nasimenta	3	3	0
Joe Riviera	1	1	0
Monsarrati Figuer	3	3	0
Esteban Ortiz	2	2	0
Frank Manchu	1	1	0

From the above list it will be seen that a total of 430 cattle were tested, out of which number 422 were passed and 8 condemned and branded.

Besides the above work, 29 post-mortem examinations were made on cattle condemned for tuberculosis.

IMPORTATIONS OF LIVE STOCK.

Out of 46 vessels boarded by the Live Stock Inspector, the following were found to carry live stock for this port:

S. S. Lurline, San Francisco—20 Holstein cows and 1 calf, Alexander & Baldwin; 1 Jersey cow, J. T. Waterhouse; 26 ets. poultry.

S. S. Sachem, San Francisco—2 ets. poultry.

S. S. Matsonia, San Francisco—1 dog, American Express Co.; 1 canary bird.

S. S. Mauna Kea, Hilo—1 dog, Mrs. Eller (ex. S. S. Enterprise).

S. S. Pensacola, San Francisco—1 dog, Lt. Kilmer.

S. S. Hyades, San Francisco—16 ets. poultry.

S. S. Lurline, San Francisco—3 horses, U. S. Army; 3 Duroc-Jersey hogs, L. L. McCandless; 63 ets. poultry.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

By Authority.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XIV—DIVISION OF ANIMAL INDUSTRY.

Under authority of Section 503 of the Revised Laws of Hawaii, 1915, the Board of Commissioners of Agriculture and Forestry hereby issues the following regulation to prohibit inter-island shipment of dairy cattle affected with tuberculosis:

Sec. 1. No dairy cattle shall be shipped from one island to another unless accompanied by a permit issued by the Territorial Veterinarian, or his deputy, on blanks supplied by this Board.

Sec. 2. Such permit shall certify to the freedom from tuberculosis of the animals in question as proven by the tuberculin test within one week previous to shipment, or certify that the animals come from a herd which has passed the tuberculin test successfully twice within the preceding eighteen months.

Sec. 3. The Territorial Veterinarian, or his deputy, shall on request of the owner or shipper, issue a permit to ship untested but apparently healthy cattle in quarantine, such cattle to be kept segregated on

premises approved by said officer at the point of destination until tuberculin tested and released by him.

Sec. 4. It shall be the duty of the owner or consignee to make sure that the said permit reaches the Territorial Veterinarian, or his deputy, before removal of the cattle from the wharf where landed, and the master, owner or agent of the vessel carrying such cattle shall not allow such removal until authorized by said officer.

Sec. 5. The Territorial Veterinarian or his deputy issuing such certificate shall furnish a copy of the same to the local agent or the master of the vessel accepting such shipment and shall mail or forward another copy without delay to the Territorial Veterinarian or his deputy at the place of destination.

Sec. 6. This rule shall take effect upon its approval by the Governor.

Approved this 25th day of February, 1920. .

CURTIS P. LAUKEA,
Acting Governor of Hawaii.

Honolulu, T. H.

By Authority

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XXI—DIVISION OF PLANT INSPECTION.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE CON- TROL OF CERTAIN INSECT AND PLANT PESTS.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rules and regulations for the purpose of controlling certain insect pests and plant pests in the Territory of Hawaii:

Section 1. No ginger plant or part thereof, no fern plant or part thereof, and no Spanish moss (*Tillandsia usneoides*), otherwise known as Florida moss or old man's beard, shall be carried, transported, or shipped from any one island in this Territory to any other island in this Territory, except by special written permit from the Board of Agriculture and Forestry.

Section 2. No ginger plant or part thereof, no fern plant or part thereof, and no Spanish moss shall be transported in any manner from one part or locality of any island to another part or locality of the same island, except by special written permit from the Board of Agriculture and Forestry.

Section 3. Inspectors and other duly authorized agents of the Board of Agriculture and Forestry are hereby empowered to examine and inspect all freight, baggage, and belongings leaving or arriving at any port of the Territory or being transported from one part or locality of any island to another part or locality of the same island and to destroy any and all ginger plants or parts thereof, and any and all Spanish moss found among or in such freight, baggage and belongings.

Section 4. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars (\$500.00) as provided by Section 529 of the Revised Laws of 1915.

Section 5. This rule shall take effect upon its approval by the Governor.
Approved this 25th day of February, 1920.

CURTIS P. LAUKEA,
Acting Governor of Hawaii.

Honolulu, T. H.

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GARDEN AND FARM TOOLS AND IMPLEMENTS

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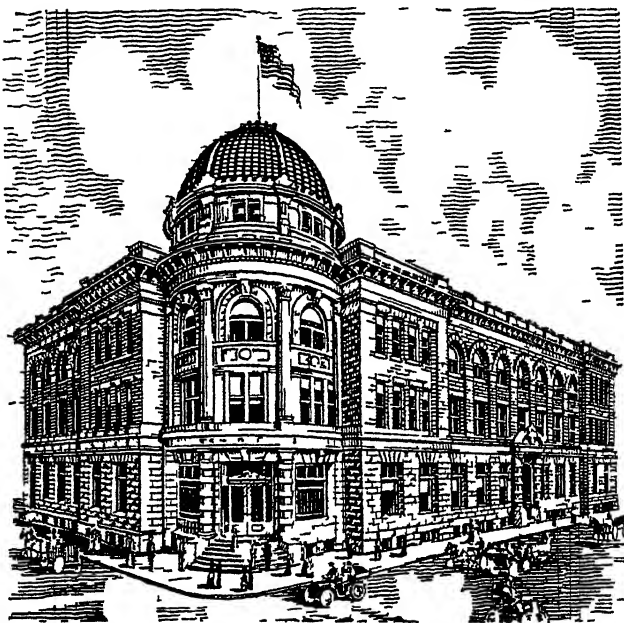
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D. T. FULLAWAY,
Entomologist.

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THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, APRIL, 1920.

NO. 4

The Forest Nurseryman distributed 64,200 trees during February to different tree planters on Oahu.

The work of eradicating the Australian fern weevil on the infested area at 29 Miles, Oloa, Hawaii, was continued during February.

The second and last installment of an article on the poisonous plants of Hawaii by Consulting Botanist J. F. Rock appears in this issue.

Methods of securing a natural enemy on an insect pest are ably related by Entomologist Fullaway in an article appearing in this number.

The mountain apples, *ohia ai*, ripening during April in the Oahu valleys, are ahead of the season this year by about three months due probably to some influence of the prolonged drought of last fall and winter.

The attention of those who desire trees for planting on the several different islands is called to the new notice of the Division of Forestry appearing in the front part of this issue.

The wiliwili tree of the dry sections of these islands is famous for its red blossoms, scarlet seeds, and very light wood. Further details concerning this tree are presented in a special article by the Superintendent of Forestry which appears in this issue.

The feeding of salt beef or salted meat to hogs is dangerous and an instance of the fatal results of this practice is described in the routine report of the Territorial Veterinarian in this number.

The attention of the Division of Forestry is now being directed to the undesirable spread of Hilo grass into forest areas by the use of trails and means are being studied for overcoming this menace to our native forests on the more important water supply areas.

Infectious abortion in cattle has unfortunately made its appearance on Oahu. Every effort is being made to control it by the use of an effective vaccine, a supply of which was secured at once upon the discovery of the disease here.

The native wild begonia, *akaakauwu*, was found early in April to be in full bloom in the shaded ravines at Kokee, Kauai, and on the forest trail to Kalalau Valley. Its delicate pink and white blossoms showing above the solid banks of ferns made a charming picture not often seen in a Hawaiian forest. The yellow blossoms of the *poolaunui*, in the same region, also presented a pleasing contrast to the usual abundance of green verdure.

The long-standing problem of removing wild cattle from the Kula Forest Reserve, Maui, and keeping them out has at last been solved by fencing. At the higher elevations on Haleakala above heavy timber growth wild cattle apparently do very little damage, but a close examination of almost every young mamani tree will show that it has been severely cropped and consequently stunted in growth by the repeated browsing of cattle.

Plant Inspection Notes

By E. M. EHRHORN, *Chief Plant Inspector.*

Quarantine Notice No. 39 with regulations of the Federal Horticultural Board prohibits the importation of seed or paddy rice and all species and varieties of wheat, oats, barley and rye, in the raw or uncleaned or unprocessed state, from Australia, India, Japan, Italy, France, Germany, Belgium, Great Britain, Ireland and Brazil on account of two dangerous plant diseases known as flag smut (*Urocystis tritici*) and take-all (*Ophiobolus graminis*). Wheat, oats, barley and rye may be imported from the countries named only under permit and upon compliance with the conditions prescribed in the regulation of the Secretary of Agriculture.

Several small packages of rice seed or paddy, as well as wheat and barley, have been seized in the mail and have been destroyed as contraband. All those interested in such shipments should notify their friends residing in the countries mentioned above not to send any of the seed tabulated as prohibited.

SCABBY POTATOES.

Within the last two months some potato shipments from the mainland showed a very bad infestation of potato scab and were

returned to the shipper. Potato scab is found in the Islands and much depends on the individual grower to prevent his potato crop from being ruined by this disease. All potatoes used for seed should be free from any scab and should be treated before planting. The best treatment is to immerse the seed potatoes for two hours in a solution of 8 ounces formaldehyde to 15 gallons of water and then let the potatoes be spread out to dry before planting. If possible potatoes should not be planted on the same ground which grew a potato crop the previous year, especially if the crop showed any sign of potato scab.

POTATOES AFFECTED WITH NEMATODES OR EELWORMS.

The nematode or eelworm has been in the Islands for some time. Many of the tender roots of vegetables and flowering plants show the tuber-like swellings and soon perish. This pest is getting well started on the Coast and especial damage is noted to potatoes. Recently a shipment from San Francisco was returned on account of being badly infested. The nematode or eelworm occupies the outer layer of the potato to a depth of about one-quarter of an inch. When present in large numbers in the potato, the surface is more or less covered with small elevations or pimples, which contain many eelworms and a tuber could contain a great many thousand of these worms.

The serious side of this infestation arises through the distribution of the diseased potatoes and the use of these especially as seed for new crops. All those interested in the growing of potatoes in these Islands should use every care not to buy either scabby potatoes or those infested with eelworms. The Division of Plant Inspection will gladly examine samples of seed potatoes for the grower and advise him as to the best methods for disinfection.

Book Review

HAWAII NEI 128 YEARS AGO, by Archibald Menzies, has recently been attractively published by Mr. W. F. Wilson of Honolulu, who last year also made available to the public an account of David Douglas' visits to Hawaii. The volume of some 200 pages, profusely illustrated, presents the journal of Archibald Menzies on his three visits to these islands in the years 1792 to 1794 while he was acting as surgeon and naturalist on board H. M. S. Discovery under Captain Vancouver. Menzies had been here twice before.

The first of the journal relates of a period 28 years before the first missionaries arrived and 33 years before Ellis and his companions made the circuit of Hawaii. Menzies had an excellent opportunity to study the islands at a time when taboos were rife and conditions were still very much the same as at the date of Captain Cook's visits. His observations on the leading Hawaiian kings and chiefs and the primitive manners and customs of the people are presented in a very interesting manner. The modern spelling of Hawaiian names has happily been adopted by the publisher, which greatly facilitates the reading of the journal.

The reader may be somewhat disappointed, however, in not finding in the journal a greater wealth of botanical description, especially in view of the fact that 19 species and varieties of Hawaiian plants, including one of the famous tree ferns, have been named after Menzies.

Menzies did much, however, to improve the flora of the islands for the immediate benefit of the early Hawaiians, for he distributed vegetable seed which he brought with him from England and landed young orange trees, sprouted on board his vessel from seed secured at the Cape. On his later voyage he had the satisfaction of seeing these growing successfully.

In connection with the introduction of cattle and sheep by Captain Vancouver, an interesting episode is related in the journal concerning their first progeny. In 1793 the first calf was born in Kona and the natives, in their eagerness to show it to Kamehameha, carried it overland to Hilo, feeding it during the several days of the journey on fish and water. Menzies relates that the calf survived this separation from its mother and even waxed fat on the unusual diet.

Probably the most interesting facts brought out by the volume are that Menzies was the first educated white man to explore the interior of Hawaii and West Maui, the first to scale Hualalai, and the first white man, and very likely the first human being, to reach the summit of Mauna Loa. His accounts of these adventures make very good reading.

C. S. J.

The Hardwoods of Australia and Their Economics. By Richard T. Baker, Curator and Economic Botanist, Lecturer on Forestry, Sydney University, and author of several other works on Australian flora.

This is a splendid quarto volume from the government printing office of New South Wales, issued under the auspices of the Technological Museum of that state. Impressed upon heavy calendered paper its 522 pages, including an exhaustive index, the book is bountifully illustrated with views of standing trees and sections of the different kinds of wood. There also are many natural color plates of the grain of the various hardwoods used in the arts.



Wilwih trees at Lualualei, Oahu.

"The object of this work," the preface sets forth, "is primarily to arouse a keener interest in, and to make known to Australians in particular and the world in general, the diversity of hardwoods with which nature has endowed this wonderful continent." According to remarks in the introduction, the softwoods form such a comparatively small proportion of Australian forests that one is quite safe in saying that the prevailing feature of the woods is their hardness. At that the number of distinct hardwoods is comparatively small, the author further remarking that, "for so vast a continent it is remarkable that the number of species of trees is not by any means great, particularly when compared with some of the Pacific group of islands, such as the Philippines, where, according to Major E. P. Ahern, there are found 2,000 tree species, while the United States and Canada have less than 700. From a rough computation Australia has probably less than 500." Genera containing large numbers of tree species, it is stated, are very few, the genus which stands out in great predominance as a timber yielder being eucalyptus, the described species of which probably number 200.

Hawaii is indebted to Australia for some of its valuable lumber trees, the Australian red cedar, a softwood, having been the subject of an illustrated article in the March number of this magazine.

The Wiliwili Tree

By C. S. JUDD, *Superintendent of Forestry*

The most delightful native tree seen by the traveler during the spring months in the arid sections of the Hawaiian Islands is the wiliwili tree, *Erythrina monosperma* Gaud., which stands out with its wealth of crimson blossoms as a very conspicuous object in the surrounding bleak landscape. This is one of the few Hawaiian trees that is deciduous, i. e., that drops its leaves. This happens in the fall and the blossoms appear on the bare branchlets from early spring to June or July before the new leaves appear so that the tree is never, or very rarely, in leaf and blossom at the same time.

The wiliwili belongs to the genus *Erythrina* (from the Greek word meaning "red") which has 30 species well distributed over the tropics. There is only one species in these islands, the *E. monosperma* (one-seeded) which is a misnomer because the pods which are hard and woody and dehisce on the tree contain often as many as 3 or 4 seeds. The same species is also found in Tahiti and New Caledonia.

The tree belongs to the bean family and the papilionaceous (butterfly-like) blossoms vary in color from an orange scarlet to pale yellow. There is no perceptible difference in the trees having blossoms of different shades, but the Hawaiians say that the wood of those with scarlet blossoms is slightly harder and more durable than the other.

The trifoliate leaves which are ovate or deltoid, broader than long, and of a dark green color when the tree is in foliage, cover the spreading crown which casts a welcome shade. The brilliant blossoms occur near the ends of the branches and these mature into pods a few inches long which upon reaching maturity open by becoming spirally twisted by action of the heat of the sun which shines from a cloudless sky wherever the wiliwili occurs. This dehiscence exposes the bright scarlet seeds which remain attached to the pods on the tree for a long time so that often one may find the brilliant seeds mixed in with new blossoms. The gayly colored seeds are often strung into very attractive necklaces.

The wiliwili tree occurs in clumps or as individuals up to 1,500 feet in elevation in the hottest and driest districts on the lee side of all the Hawaiian Islands. It grows luxuriantly in such regions where few other trees could exist and is frequently found coming up along water-courses or on the flat plain where freshets have washed down the seed from the parent tree further inland. The tree attains a height of from 20 to 30 feet and the short trunk is often 3 to 4 feet in diameter. The tree usually has a broad spreading crown composed of stiff, gnarled, whitish green branches, and both trunk and limbs are frequently armed with short, stiff horns. The trunks are often a dirty orange yellow in color.

A related species, *Erythrina indica*, has been introduced and planted in and about Honolulu. This is called the "Coral Tree" on account of the color and resemblance of the blossoms to the red coral, and also "Tiger's Claw" on account of the claw-shaped flowers. This has pods from 4 to 8 inches long which contain several dark carmine colored seeds and which do not open but fall off entire from the tree. The wood of this species is used in Guam for making troughs and in Samoa the dead, dry wood is used for keeping fire in native houses, as it will smolder for a long time without going out. In Samoa also and in other islands of the Pacific, the natives reckon the change of seasons by the flowering of this tree.

The wiliwili tree in Hawaii is probably best known because of its wood which is the lightest of any of the island trees. The wood, although soft and about as light as cork, was much used for the *ama*, the float of the outrigger canoe for which purpose it was admirable. The wood was also used for floats for fish nets, for carved stools placed under the canoe when drawn up on the beach or laid up in the canoe house, and for the narrower



surfboards, which Ellis says were the best, because of their light weight. In the early days the branches were used in the erection of fences by cutting slips and setting them in the ground. These took root and sprouted and formed a living fence which was permanent.

The supply of wiliwili trees has been greatly depleted because the larger ones have been cut for outrigger floats. Formerly this was a common tree on the rocky hills and dry plains in the lower open lee regions on all the islands, but it is now becoming somewhat rare.

The wiliwili is a tree well worth cultivating for its beautiful blossoms and handsome seeds and is easy to raise from the bean.

The Poisonous Plants of Hawaii

By J. F. Rock, *Consulting Botanist.*

(Concluded.)

STAR OF BETHLEHEM (*Isotoma longiflora*).

This rather attractive herbaceous plant with long, tubular white scented flowers has been in cultivation on the Island of Hawaii, especially in Hilo. The seeds of this species are very minute and are easily dispersed by both wind and birds, which accounts for its spreading over pasture lands in the vicinity of Hilo and to vacant lots in the town proper. It is a native of the West Indies and is one of the most poisonous plants found in Hawaii. So far as the writer is aware, no chemical analysis has been made, but that the plant is exceedingly poisonous (not to the touch) there is no question. It belongs to the order *Lo-belioideae* or *Lobelia* family.

CORAL BUSH (*Jatropha multifida*).

A member of the *Euphorbia* family and extremely poisonous. It is often called the coral tree on account of its scarlet flowers. The leaves are deeply divided, hence the name *multifida*. The fruits and juice of this plant are extremely poisonous, especially the former. A little Japanese boy, ten years old, died of the effects from eating a couple of fruits of this species in Nuuanu Valley last summer. The fruits are yellow and of the size of a walnut. The species is in cultivation in Honolulu, but is not common. It is a native of tropical America.

PINHOEN OIL TREE OR CUBAN PHYSIC NUT
(*Jatropha curcas*).

This small tree with somewhat fleshy stem and branches is found wild in valleys on the windward side of the Island of Hawaii, but is by no means common. In Guam the writer saw this plant employed as a hedge plant and it is one of the commonly-met-with species. The seeds of this species are said to be edible, but when eaten in excess produce serious trouble and death often results. They are nutty and have a pleasant flavor. The fruits are of the size of a walnut, yellowish and somewhat fleshy and of the same size as those of *Jatropha multifida*.

SAND-BOX TREE (*Hura crepitans*).

This medium-sized tree, which belongs to the same family as the foregoing species, is rare in Honolulu where only it is cultivated. The male and female flowers, the latter consisting of a pistil only without a corolla, are borne on the same tree but on different branches. The fruit is a capsule of many compartments. The sap of this species is extremely poisonous and when applied to the skin produces eruptive pustules resembling those of erysipelas. It is exceedingly injurious to the eye and is said to cause blindness. It contains an acrid poison and when taken internally produces vomiting and diarrhea. The seeds are employed as an emetic.

APPLE OF PERU (*Nicandra physalodes*).

The plant in question, which has no common name, is a weed in and about Honolulu, especially common at Kaimuki. It is an annual and the fruits, enclosed in their papery calyx, resemble very strongly the well-known *Poha* or Cape Gooseberry. The plant is from two to five feet in height, the leaves are angular or sinuate toothed; the flowers are pale blue and rather large; the fruit is a globular dry berry, the calyx becomes enlarged and is bladder-like in fruit. It is said to be poisonous and is used as a fly poison in the United States.

RAGWEED (*Ambrosia artemisiifolia*).

This very common rag or stink weed which has made its appearance on Oahu and Molokai, is especially common along the government road between Honolulu and Haleiwa; in the latter place it is very abundant.

While it is not exactly poisonous, it is an astringent and a stimulant and causes hay-fever; the cause being in all probability the pollen which is produced in great abundance and is irritating to the air-passages of many people.

THE YARROW (*Achillea millefolium*).

This European weed has of late made its appearance on Hawaii where the writer found it along the Volcano road. It is considered poisonous though sheep will eat the weed.

It seems to have a decided action on the blood-vessels, especially in the pelvis. It is stated that it causes burning and raw sensations of the membrane with which it comes in contact, giving considerable pain in the abdominal regions, accompanied by diarrhea and enuresis. The alkaloid principle is *achillein*, $C_{30}H_7N_2O_{15}$.

BLACK-EYED SUSAN (*Abrus precatorius*.)

This vine, which is more or less common in Honolulu, belongs to the bean family or *Leguminosae*. The seeds are small, the size of a pea, red in color and have a black spot, hence the name. The poisonous substance found in the seeds of this species is a toxalbumin called *abrin*. It is considered a fish poison and is employed similarly to the *Auhuhu* or *Hola*.

The toxalbumin *abrin* is similar to that of the castor oil plant known as *ricin*, this latter is more poisonous than strychnine and prussic acid. It may not be out of place to make further mention of *ricin*, although the plant has been discussed in the first paper. The following is said about *ricin*, by Blyth: "If castor oil seeds are eaten, a portion of the poison is destroyed by the digestive processes; a part is not thus destroyed, but is absorbed, and produces in the blood vessels its coagulating property. Where this takes place, ulcers naturally form, because isolated small areas are deprived of their blood supply. These areas becoming dead, may be digested by the gastric or intestinal fluids, and thus, weeks after, death may be produced. The symptoms noted are nausea, vomiting, colic, diarrhea, teresmus, thirst, hot skin, frequent pulse, sweats, headache, jaundice, and death in convulsions or from exhaustion."

The toxalbumin in *Abrus precatorius* causes similar effects and symptoms. The *abrin* when applied to the conjunctiva causes coagulation in the vessels and a secondary inflammation.

Dr. Warden of India, who experimented with the poisonous properties of the plant, found that half a seed rubbed down with a small quantity of water and injected into the thigh of a full-grown cat produced fatal effects in 24 hours.

PUAKALA (*Argemone mexicana*).

The Mexican Poppy or *Puakala* is native in Hawaii, but is also found in Mexico and Texas. It occurs in dry waste places, especially near Koko Head, the Waianae region and other dry localities, but is restricted to the lowlands.

The yellow milk of this plant contains narcotic principles such as morphine. The natives employed the latex in cases of tooth-ache; a few drops would be placed in the cavity of the offending tooth.

PRIDE OF INDIA (*Melia azedarach*).

This ornamental tree is said to be poisonous and it is said that hogs have been poisoned by eating the seeds.

POORMAN'S OR SHEPHERD'S WEATHER GLASS OR PIMPERNEL (*Anagallis arvensis*).

This prostrate little herb with opposite leaves and reddish flowers, a member of the Primula family, is very common in the meadows and pasture lands on all the islands. The plant is of more or less recent introduction, as it is not mentioned in Hillebrand's Flora of the Hawaiian Islands. It is known to be poisonous and to contain glucoside cyclamin. It is considered a fish poison, as it is used in intoxicating fish. It is used in cerebral affections, leprosy, hydrophobia, dropsy, epilepsy and mania. It produces, if taken internally, inflammation of the stomach.

MILK-BUSH (*Euphorbia tirucalli*).

An African tree with round stem and smooth branches which are green and usually leafless; the leaves when present are very small and inconspicuous. The juice of this tree is very poisonous and causes excruciating pain if it gets into cuts in the skin or in the eye and is apt to destroy the eyesight. There are very few plants of this kind in Honolulu. The largest clump known to the writer is in the vacant lot opposite the Moana Hotel.

SAMUDRA (*Barringtonia asiatica*).

A large and handsome tree cultivated in Honolulu. The large fruits with their fibrous quadrangular husk is considered poisonous. The bark of the tree contains a narcotic and is used in stupefying fish without killing them.

WILD SWAMP VIOLET (*Hydrocotyle asiatica*).

This plant is one of the most common weeds found in lawns and pastures on all the islands, especially in the wetter regions. It is also known under the name of Asiatic Penny-worth. The plant was known to Sanskrit writers of very remote times and was even then regarded as useful in skin diseases. But in 1852 its virtues were first made known by Boileau, in the treatment of leprosy. The drug prepared from this plant if administered

produces diuretic effects, a general stimulation of the circulation and finally intense itching; larger doses produce considerable giddiness, spasmodic contraction of the larynx, palpitation of considerable violence and tetanic spasm of the trunk and limbs.

The Melon Fly

ITS CONTROL IN HAWAII BY A PARASITE INTRODUCED FROM INDIA.

BY DAVID T. FULLAWAY, *Entomologist*.

(From Report of the Proceedings of the Third Entomological Meeting,
held at Pusa, India, February, 1918.)

The Hawaiian Islands are situated in the midst of a vast ocean. They are completely isolated from the continent, so that insects detrimental to agriculture cannot easily reach them. But with the development of trade on the Pacific, the Islands have become a commercial crossroads, a day seldom passes without a steamer putting into our main port, and despite the strict inspection and quarantine of horticultural products a serious pest now and then does slip in. Our equable climate permitting almost continuous breeding, an excessive multiplication and rapid spread of the pest soon result. Thus it was that the melon-fly (*Bactrocera cucurbitae*) gained access to the islands about 1895, and thereafter melons of any sort could not be grown successfully. A somewhat similar experience later with a more destructive insect, the Mediterranean fruit-fly, aroused public interest to the extent of inducing the Government to experiment with the possibility of controlling the injuriousness of the fly by searching out and introducing its parasites. that is to say, other insects that were known or could be ascertained to live at the expense of the first. Parasitism among insects is a very common phenomenon, which even the layman today is acquainted with, and the check which this parasitism exerts on the multiplication of insects is also well known. It should be pointed out here that the same circumstances which prevent the migration of injurious insects to our isolated islands, also prevent beneficial insects from reaching us. Likewise, the same causes which lead to the rapid spread and excessive multiplication of injurious introductions operate equally on the beneficial ones that prey upon them. In other words, the method of controlling injurious immigrant insects by the introduction of their parasites is particularly applicable to Hawaiian conditions. The experiment that was tried with the Mediterranean fruit-fly was successful to a very

large degree and induced the Government to go further and see what could be done to control the ravages of the melon-fly. In this way the writer was engaged in July, 1915, to investigate the parasitism of the melon-fly and obtain whatever natural enemies could be discovered.

Before going on to the detailed account of the expedition, it should be stated that when the search for melon-fly parasites was begun, our knowledge of the fly outside of Hawaii was very limited, consisting almost wholly of the probable distribution of the fly gained from the meagre records of Compere and Muir and the publications of the Imperial Entomologist of India. Nothing positive was known of parasites, although Muir's accounts of the relative scarcity of the fly in certain localities gave a measure of confidence to the assumption that parasites existed.

In regard of the facilities offered by the Government laboratories in India, it was considered that it would be the country to work first, and on 23rd July I set out with the intention of going directly to Pusa in India. When I reached Manila, however, I went up to Los Baños to have a conference with Muir, and it was largely on his recommendation that I decided to work first around Singapore.

While at Hongkong, 17-20th August, on my way to Singapore, I made a short trip up the river to Macao, where Muir and Kershaw had worked considerably, to determine its suitability as a breeding station on my probable return with parasites.

Leaving Hongkong on the 20th, I arrived at Singapore on the 26th, located a supply of infested fruit in some Chinese vegetable gardens, and set up my laboratory in a room over the hotel garage. Here I worked over a month, rearing melon-flies out of cucumbers and a few *Momordicas* and *Luffas*. At the end of a week on opening some of the puparia, I found a single female *Opius*, and shortly after two males, and felt encouraged to go on. However, although more than 6,000 flies were reared, no further parasites were obtained, and I decided to continue on my way to India. I attribute the meagre results obtained in Singapore to the character of the fruit used, and the manner of its cultivation. The only cultivated cucurbit to be obtained in any quantity is the cucumber, which is produced by Chinese market gardeners under conditions which are very favorable to mould—the ground where these gardens are is low, and it is the custom of the Chinese to wet down the beds three or four times a day with liquid manures. I think if wild *Momordicas* could have been obtained, the parasites would have been more abundant, but under the conditions described, the parasites have little chance to multiply.

The method used to ascertain what parasitism existed was very simple. Infested fruit was placed in cages on sand, and as soon as the maggots had emerged and pupated, the sand was screened to separate the puparia, which were then placed in shell vials.

After a few days, the flies would emerge from unparasitized material, and these were liberated daily until emergence ceased. The material was then gone over and everything discarded except the sound puparia, which would be suspected of containing parasites. When parasites emerged they were conducted as soon as possible into 6"x1" test-tubes containing a fresh leaf holding drops of honey and water. About twenty parasites can be kept in good condition in a single tube and if carefully attended they can be expected to live at least a month. If necessary to hold longer, they can be reared in confinement wherever a good supply of infested fruit can be obtained.

At Singapore I had the misfortune to lose part of my equipment and I utilized the time necessary to have it replaced in investigating melon-fly conditions in Java. It is only a 36-hour run from Singapore to Batavia, and another 3-hour journey on the railroad to Buitenzorg, the seat of Government and location of the scientific laboratories. The director of the scientific work, Dr. Konigsberger, showed sympathetic interest in my mission, and kindly offered me a desk in the Strangers' Laboratory. I spent nearly a month in Java, 10th October to 6th November, and in this time reared between 4,000 and 5,000 flies. In due course the material disclosed the parasite found at Singapore, and I was able to take a small lot of males and females away with me. My time in Java was limited, and the work done there was done too hurriedly to give anything more than an impression of the conditions, but the impression was very favorable. Cultivated fruit was scarce at that season of the year, and *Momordicas* were used very largely in rearing flies. These fruits are not cultivated in fields or gardens, but are grown by the natives around their houses, and are, therefore, very much scattered. The cultivated fields appeared clean, and I was told that two pickings are usually secured before an infestation is noticed. A large ground-beetle was very active here.

On returning to Singapore, I found a letter from Muir giving encouraging information in regard to the Philippines, but I had already made my plans to go to India, and was obliged to defer the investigation of this new field till later.

Leaving Singapore on the 9th of November, we arrived at Negapatam on the 16th, and from there I proceeded by rail to Bangalore, in Mysore State, a locality highly recommended by Compere. I may say that the idea of going to Pusa had to be abandoned on account of the low temperatures prevailing there during the winter months. I found Bangalore suited to my purposes, although it is not, as I had expected it to be, in a rich agricultural or fruit-growing section; it is one of the hill stations of India, in normal times with a garrison of more than 10,000 troops, and on account of its fine climate, has attracted many Indian pensioners. It was natural, therefore, to find on the outskirts of the city extensive gardens, and my first examina-

tion of these revealed the melon-fly. I utilized a small room in the hotel as a laboratory, and was soon rearing hundreds of flies. Before I had a chance to breed the parasites brought from Java, the same species appeared in Indian material, and in a very short time I had a flourishing colony. I spent five weeks or more in India, rearing about 10,000 flies. Out of these *Opius fletcheri* came abundantly, and I was also able to cultivate a small lot of *Spalangia*, but nothing further appeared, and after my own extensive work and the assurance of Mr. Fletcher, the Imperial Entomologist, that nothing else had ever been bred by them from *D. cucurbitae*, I decided I had exhausted this field and it was time to move on to the Philippines. All the while in India I was looking closely for *Syntomosphyrum indicum*, the fruit-fly parasite introduced by Compere into Australia, by Lounsbury into the Cape, and by Silvestri into Italy, but I saw nothing of it, and the Indian Entomologist could give me no information about it beyond what I already knew.

Leaving Bangalore on the night of 23rd December for Colombo, I was detained by the Indian police at Dhanuskodi for three days *en route*, but arrived in ample time to catch the Spanish mail 31st December, and after an uneventful voyage of 18 days reached Manila with about 75 living examples of the Indian parasite, *Opius fletcheri*, which I had carried with me on leaving India. While stopping in Singapore I had also secured infested fruit to breed the parasite *en route*, and from this material I subsequently got 64 additional individuals.

In Manila I received very generous assistance from the Bureau of Agriculture and Science, and established a laboratory in a room set aside for me at the latter institution. I found fruit very scarce and practically no cultivated cucurbits. Under the circumstances I was obliged to depend entirely for rearing and breeding purposes on *Momordicas*. These fruits are dry and do not give the same trouble with regard to mould that cucumbers do; at the same time they contain very few maggots, and are got only with great exertion and loss of time. As a consequence my stock of parasites dwindled, and I was disappointed in the hope of finding additional species. I spent nearly three months in the Philippines, rearing about 18,000 flies, but nothing new disclosed itself. This seemed strange in view of the rich fruit-fly fauna there, which is known to harbor several species of Opiine parasites. I also lost the small colony of *Spalangia*, one generation running to males.

It was unfortunate that at the time of leaving Manila, the steamer connections were such that I was obliged to remain in Hongkong a week. I used this intermission in the voyage to the best advantage, but my fruit-fly parasites had dwindled to very small proportions by the time of my arrival in Honolulu, on 10th May, 1916,

From this small stock, however, the parasite was successfully

multiplied and in the course of a month or two it was possible to liberate large lots in suitable localities. This artificial propagation has continued to the present date and thousands of the parasites have been sent out to every locality in the islands where melons are grown. By August, 1916, the parasite was recovered from fruit gathered in Honolulu gardens, and we were soon assured of the success of the introduction. At the present time the parasite accounts for the destruction of 50 per cent. of the melon-fly infesting our fruit, as ascertained from rearing parasites and flies from different localities in the islands, and in some localities it is again possible to grow melons successfully.

Division of Forestry

Honolulu, Hawaii, February 29, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of February, 1920:

TREE PLANTING.

Weather conditions remained rather dry during the month so that this work was confined largely to the making of holes for the planting of trees later on. A few showers, however, made possible the planting of 555 red gum trees along the newly constructed fence at Kulihouou, 216 koa trees in Makiki, and 140 Japanese cedar and 350 Norfolk Island pine trees at Waiahole, making a total of 1261 trees planted during the month. To the Waiahole Nursery 2000 Australian red cedar seedlings and to the Mikilau Nursery 6000 seedlings of the same species were delivered for transplanting and holding until they are large enough to be planted out.

A shipment of 14 kauri pine seedlings, packed in moss without soil, was made by mail to Makawao, Maui, and reached the destination in excellent condition.

FOREST FIRE.

In spite of the very dry condition of the forests, due to the lack of rainfall, only one forest fire was reported during the month. This occurred on February 12 in the Kohala Mt. Forest Reserve, Hawaii, on government land in Pololou gulch. It was started by a small boy making a fire in the bottom of the gulch. The fire spread to the undergrowth on the west side of the gulch and traveled very rapidly towards the mountains, threatening the cane fields of the Niulii Mill and Plantation. Laborers under the direction of Manager J. A. McLennan promptly rushed to the scene and fighting the fire from 8 a. m. to 4 p. m. succeeded in extinguishing it before it had done any considerable damage.

Early in the month warnings were sent out through the medium of the press cautioning everyone to be careful and not to start any fires on account of the inflammable condition of the woods.

WAIHOLE EXCHANGE.

On February 13, I accompanied President Rice and Land Commissioner Bailey to Waihole, Oahu, and pointed out to them the lands involved in the proposed exchange, which is again presented for your consideration in the form of a separate report.

PROPOSED RULE V.

During the month I received from the Survey Office a map and description of the forested area at the heads of Palolo and Manoa valleys for use in the preparation of a new rule of this Division which will give this area greater protection. I consider the retention of the forest growth, and its preservation in a healthy condition, on these steep mountain slopes of such importance for the perpetuation of the streams and springs emanating from them, that it is necessary to do our utmost in giving the forest the greatest protection possible. A part of this region has included a favorite route for trampers who unintentionally spread Hilo grass through the region and whose trails have in some instances caused landslides. The only way to correct this and to prevent further damage of this nature is to exclude human beings from the area. It will be much cheaper to do this now rather than to try to reforest the area after the growth has been destroyed by further damage. For this purpose I have prepared Rule V forbidding trespass on this area, similar to Rule III covering upper Nuuanu Valley, and have sent advance copies for endorsement to parties who are interested in forest protection and to the Trail and Mountain Club for comment so that the rule will be thoroughly understood and appreciated before it is presented to the Board for adoption.

MAUI TRIP.

From February 17 to 21, I was on the Island of Maui attending to several matters which I had not been able to look into sooner.

KULA FOREST RESERVE.

This reserve was thoroughly inspected and found to be receiving better protection than ever before. Through cooperation with the Raymond Ranch, during the past summer, approximately 2.68 miles of fence have been built on the top of the ridge from Polipoli Springs to Kanahanu. This has been a big factor in facilitating the driving out of the wild cattle from this reserve and in preventing new bands from crossing over from the Kahikinui side. From Kanahanu to Kalepeamo there still remains an unfenced gap of about half a mile which should be closed up to give this part of the reserve complete protection from wild stock. This the Raymond Ranch has agreed to do as soon as possible and the wire for this purpose has been ordered. From Kalepeamo down the slope along the boundary between Kaonoulu and Waiohuli the Kaonoulu Ranch has in cooperation with this office constructed during the past year stone walls and wire fences amounting to a total length of 1.40 miles so that cattle can not now get into the reserve from this side. With the above fencing completed it will then be possible to proceed with the reforestation of the area.

The old fence near Polipoli Springs is in need of repair and the Land Commissioner has been called upon to require the holder of Land License No. 542 to attend to this so that tame cattle from the Kula pastures will no longer trespass on the reserve. Owners of stock in this region have been reminded of Rule II of this Division and have been warned not to allow their stock to graze on the reserve.

HAIKU NURSERY.

The new nursery of the Division at Haiku, Maui, was inspected and found to be in good running order. Under the supervision of Ranger James Lindsay a good stock of trees has been grown and this nursery is now prepared to supply the demand for trees on the Island of Maui.

ALGAROA THINNINGS.

Part of a day was spent in the algaroba forests near Kihei at the request of the Land Commissioner advising the holder of an algaroba bean gathering license as to the proper method of thinning out the algaroba trees and disposing of the tops and tangle of brush so as to increase the bean production and facilitate their gathering.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, Hawaii, March 4, 1920.

Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit a report of the work done during the month of February.

NURSERY.

Distribution of Plants—

	In Seed Boxes.	In Trans- plant Boxes.	Pot Grown.	Total.
Sold		100	85	185
Gratis, including forest reserves..	8,100	480	234	8,814
Total	<u>8,100</u>	<u>580</u>	<u>319</u>	<u>8,999</u>

COLLECTIONS.

Government Realizations—

Collections on account of plants sold.....	\$ 1.85
Rent of Office, Nursery Grounds, for January.....	35.00
Total	\$36.85

PLANTATION COMPANIES AND CORPORATIONS.

Under this heading 55,200 trees in seed boxes were distributed.

MAKIKI STATION.

At this station the work has been principally routine, consisting of mixing and sterilizing soil, transplanting trees into pots and boxes, etc.

HONOLULU WATERSHED PLANTING.

Trees planted in Opu Valley amounted to 216 koa trees. Preparations are being made for the planting of koa trees on the open land adjoining the Schmidt estate on Diamond Head side. The road runs through this land and it is a choice place for planting trees.

ADVICE AND ASSISTANCE.

The writer has been called upon to make the following number of visits and otherwise give advice and assistance:

Calls made	8
Advice to people calling	10
“ by telephone	6

HAWAII NURSERY AT HILO.

Brother Matthias Newell, in charge of the nursery for the Island of Hawaii, at Hilo, reports that the distribution of plants from his nursery for the calendar year 1919 amounted to a total of 12,303.

KAUAI NURSERY AT KALAHEO.

The nursery for the Island of Kauai is located at Kalaheo and is in charge of Joe Rita, Jr. Mr. Rita reports that he distributed a total of 3,602 trees from his nursery during 1919, as follows:

Sold	1,420
Gratis	661
Papapaholahola Spring Reserve	1,521
	<hr/>
	3,602

The report of the number of trees distributed during 1919 from the nursery for the Island of Maui, located at Haiku, will appear in the next monthly report, as it has not yet arrived.

The distribution of trees from this nursery during 1919 will also appear in our next report.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, Hawaii, March 5, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of February the insectary handled 19,700 pupae of the melon fly, from which there were bred 3,657 females and 2,480 males, *Opius fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opius fletcheri.

Oahu:	Females.	Males..
Cucumber Field, Kalakaua Avenue.....	200	200
Cucumber Field, Moanalua	635	365
Keasau, Waianae	680	680
Niu	680	480
Waikiki	100	100
Molokai:		
Kamalo	200	200

FRUIT FLY PARASITES.

Diachasma tryoni.

Oahu:		
Waikiki	185	185
Kalihi	50	50
Piikoi Street	60	60
Nuuanu	200	200

Diachasma fullawayi.

Oahu:		
Waikiki	30	30
Nuuanu	70	70
Kalihi	50	50

Tetrastichus giffardianus.

Oahu:		
Waikiki		500
Nuuanu		400
Kalihi		300

Dirhinus giffardi.

Oahu:		
Nuuanu		400

Opius humilis.

Oahu:		
Nuuanu	80	80
Waikiki	50	50

CORN LEAF HOPPER PARASITE.

Parunagrus osborni.

Oahu:		
Kaneohe		2,800

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, Hawaii, February 29, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of February, 1920, as follows:

During the month 63 vessels arrived at the Port of Honolulu, 22 of which carried vegetable matter and 12 vessels came through the Panama Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	523 lots	17,436 pkgs.
Burned.....	67 "	67 "
Fumigated.....	8 "	9 "
Returned.....	2 "	261 "
Total Inspected.....	900 "	17,773 "

Of these shipments 17,457 packages arrived as freight, 184 packages as mail and 132 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 23,035 bags of rice from Japan, 200 mats of rice from China and 2,107 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 3,940 pieces of baggage belonging to immigrants from foreign countries were examined from which 32 lots of fruit and 22 lots of vegetables were seized and destroyed.

On February 4 a package of rice paddy found in the baggage of a passenger from China was seized and destroyed. A package of seeds for Professor Rock from Egypt was fumigated on account of weevils.

On February 5, per Shinyo Maru, a package of corn found in the baggage of an immigrant from Japan was seized and destroyed under quarantine Notice No. 24 of the Federal Horticultural Board. A package of rice paddy in the mail from Japan was also seized under Quarantine Notice No. 39. A package of pili nuts and a package of seeds, both from Manila, were found in the mail and fumigated as a precautionary measure.

On February 8, per Kiyo Maru, a package of grass seed in the mail from Japan was fumigated as a precaution.

On February 11, per Siberia Maru, a package of chestnuts found in the baggage of an immigrant from Korea and a plant in the baggage of an immigrant from Japan were both seized and destroyed, one being weevily and the other prohibited. A package of rice paddy and a package of corn in the mail from Manila, as well as a package of fruit in the mail from Japan, were seized and destroyed.

On February 17, per Maui from San Francisco, a consignment consisting of 260 bags of potatoes for L. Ah Leong from Jacobs, Malcolm & Burt, was found badly infested with potato scab and ordered returned to the shipper. A package of corn in the baggage of an immigrant from Manila per Colombia was seized and destroyed.

On February 23, per Persia Maru, a package of vegetable seeds from Japan and 2 tins of tree seeds from Java for the H. S. P. A. were

found in the mail and fumigated as a precaution; 2 packages of paddy rice from Japan were seized and destroyed.

On February 26, per Shinyo Maru from San Francisco, 2 cases of oranges badly infested with scale insects, were taken from a passenger and fumigated with HCN.

On February 27, 3 packages of paddy rice in the mail from Manila by the Santa Cruz, were seized and destroyed.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of six vessels at the Port of Hilo. Four carried vegetable matter consisting of 74 lots and 1,436 parcels. These were all found free from insect pests excepting one lot of turnips, the leaves of which were infested with aphids. After removing same and destroying them, the turnips were passed. Two thousand eight hundred and eighty-three bags of rice and 110 bags of beans arrived per Kiyo Maru from Japan and were passed.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of eight vessels at the Port of Kahului. Two of these, the Manoa and the Lur-line, carried vegetable matter consisting of 12 consignments and 719 parcels, all passed as free from pests and plant diseases.

INTER-ISLAND INSPECTION.

Fifty-five steamers plying between Honolulu and the other island ports were attended and the following shipments passed as free from infestation:

Taro.....	517 bags
Vegetables.....	328 pkgs.
Fruit.....	187 "
Plants.....	91 "
Seeds.....	20 "
Pineapple shoots.....	825 bags
Sugar cane.....	19 cases
Total passed.....	1,987 pkgs.

Six packages of plants and ferns and three cases of vegetables were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, Hawaii, February 29, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I beg to submit the following report of the work of the Division of Animal Industry for the month of February, 1920:

SALT POISONING IN HOGS.

On the 4th instant, an outbreak of an acute disease among the hogs in a large piggery at Kaliouou was reported to this office. On arrival it was found that one sow had died and that three more were very ill, being partly paralyzed, trembling all over and frothing at the mouth. Post-mortem examination failed to show any of the usual symptoms of either hog cholera or swine plague. Only a hemorrhagic condition of the stomach and inflammation of the small intestine were observed. The symptoms were as those of salt poisoning, which diagnosis was borne out by the owner's statement to the effect that he had, a few days before, obtained a dead horse which he had cut up and salted down for future use as he had at the time plenty of feed on hand. In feeding this meat to the hogs, he had failed to wash it out sufficiently, not knowing that salt constitutes a strong poison for hogs.

A similar case was observed some years ago at Puuloa where a considerable number of hogs were lost, and it would be well for hog owners to take note of this fact and to remember to soak all such salted meat well before feeding it to these animals.

The treatment of the sick hogs consisted in placing them in a creek with fresh running water in order to make them drink as freely as possible. If laxatives are given, oil should be used in preference to salts. The three sick hogs recovered.

HEMORRHAGIC SEPTICEMIA ON MAUI.

On the 14th instant, Dr. Fitzgerald reported an outbreak of hemorrhagic septicemia in the Makawao district. Only one animal had died and the remaining ones were segregated and vaccinated. No further deaths occurred.

The hemorrhagic septicemia vaccine, which was ordered by wireless for the treatment of the outbreak reported last month from the same district, was received on the 9th instant, and immediately forwarded to Maui and applied to the purebred herd above referred to. No more cases have occurred in this herd either.

INFECTIOUS ABORTION IN CATTLE.

I regret to report that this disease seems finally to have made its appearance in the islands. Two cases were reported in the largest purebred Holstein herd in Honolulu, both resulting in death on account of complication with hemorrhagic septicemia. As this disease is caused by a specific micro-organism, various scientists have succeeded in making an effective vaccine for its prevention and treatment. A cable was consequently sent without delay for a sufficient amount of the vaccine to treat this and other herds, in case the disease should show any inclination to spread. This vaccine has now been received and will be applied in the course of a few days.

IMPORTATION WITHOUT PERMIT.

On the 5th instant, the U. S. A. T. Logan arrived here with one dog which the owner declared he had smuggled on board and had intended to remove in the same manner if its presence had not been discovered. The case has been referred to the Attorney General for action.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Dr. Victor A. Norgaard, Chief, Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu.

Sir:—I have the honor to submit the following routine report for the month of February, 1920:

TUBERCULOSIS CONTROL.

The following cattle were tested during the past month:

	Tested.	Passed.	Con. demned.
C. S. Judd	2	2	0
C. H. Bellina	57	57	0
C. W. Lucas	28	28	0
Waialae Ranch	386	375	9
Chas. Lucas	136	136	0
Chas. Lucas	12	11	(1 suspect)

A total of 621 head of cattle were given the intrapalpebral tuberculin test out of which number 611 were passed as free from tuberculosis, 9 were condemned and branded and 1 held in quarantine as a suspect.

CONTAGIOUS EPITHELIOMA.

Forty chickens were injected with vaccine during the month for this poultry disease.

IMPORTATIONS OF LIVE STOCK.

A total of 50 vessels were boarded at the Port of Honolulu, of which the following were found to carry live stock for this Territory:

S. S. Matsonia, San Francisco—1 crate chickens, American Ry. X. Co.
S. S. Natchem, San Francisco—1 Berkshire boar, Alexander & Baldwin (Kam. School); 28 crates poultry.

S. S. Manoa, San Francisco—2 cats, C. A. Reynolds; 1 dog, Mrs. R. P. Howell; 2 crates rabbits, American Ry. X. Co.; 43 crates poultry, various; 1 caged lion, Carter Co.; 1 cage of monkeys, Shriners' Happyland.

U. S. A. T. Logan, San Francisco—1 dog, Lieut. James G. Bishop.
S. S. Lurline, San Francisco—12 Holstein cows, 1 calf, Chas. Lucas; 2 horses, U. S. Army; 8 crates poultry.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

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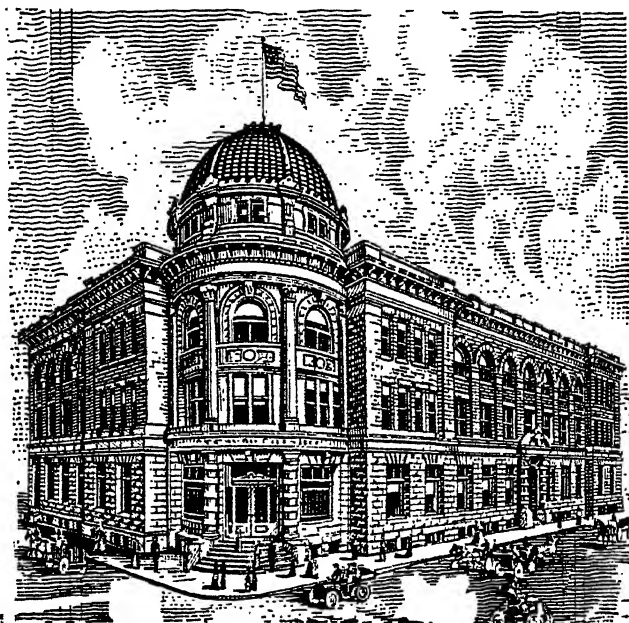
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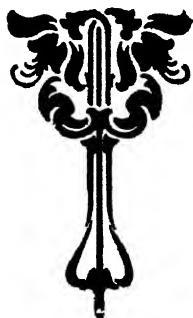
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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEEDLINGS FOR SALE AT GOVERNMENT NURSERIES.

The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papaholohola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

HILO, HAWAII. Nursery at the Boys' Catholic School in charge of Bro. Matthias Newell, Hilo.

PRICES: Plants in seed boxes \$1.00 per 1000. Transplants in boxes 1c each. Transplants in pots 2½c each.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, MAY, 1920.

NO. 5

Change in Presidency

Captain A. L. C. Atkinson was on May 7, 1920, appointed by Governor McCarthy as President of the Board of Commissioners of Agriculture and Forestry in the place of Mr. A. H. Rice, who on May 4 resigned from the presidency on account of the increased demands on his time in his private business. Mr. Rice, however, remains a commissioner on the Board.

Captain Atkinson is well fitted for the position from his long experience and familiarity with Territorial work.

The annual reports of the four divisions of the Board—Forestry, Entomology, Plant Inspection and Animal Industry—for the calendar year 1919 appear in this issue and indicate the progress that has been made along the various lines of activity.

Attention is called to the article on the Makiki Nursery appearing in this issue and to the fact that visitors to this nursery are always welcome.

Six thousand packages of vegetable seed have been received at the Government Nursery from our Delegate to Congress, Hon. J. K. Kalanianaʻole, and are now available for distribution by mail or in person to those who desire and can make good use of them. Applications for the seed should be sent to Mr. David Haugh, P. O. Box 207, Honolulu.

A virulent form of hemorrhagic septicemia broke out in cattle at Naalehu, Kau, Hawaii, early in May with so far 80 deaths from the disease. The Territorial Veterinarian is busily engaged in vaccinating the herds in that region to prevent further losses.

How well the scenic beauties of these islands compare with the attractive features in the national parks on the mainland was pointed out by Mr. H. M. Albright, Field Assistant to the Director of the National Park Service, who is familiar with all of the

U. S. national parks. After his recent visit to the Territory in late March and early April Mr. Albright was very much delighted with the Haleakala and Mauna Loa sections of the Hawaii National Park and stated that the Kilauea section equalled, if not surpassed, any feature in any of the numerous national parks.

The Makiki Nursery

By C. S. JUDD, *Superintendent of Forestry.*

Those who are interested in horticulture would no doubt find quite instructive and well worth while a visit to the nursery of the Board of Agriculture and Forestry in Makiki Valley, Honolulu. Here not only are young trees propagated and raised for distribution, which involves the sowing of seed and transplanting of seedlings, the making of boxes, cutting of tins, and sterilization of the soil, but also corn and cabbages are raised to supply material on which natural enemies of insect pests of these two plants are propagated by the entomologist.

As a rule the seed is sown in boxes in special propagating houses at the Government Nursery on King street and then taken up to the Makiki Nursery where the young seedlings are transplanted into tins or pots or into boxes.

All of the soil used in these operations is carefully prepared, it consisting of one-third sifted, sharp, volcanic sand, one-third good soil, and one-third well rotted manure. The sand affords good drainage and keeps the soil light. The mixture is screened and then sterilized by placing it in a tight box through which run steam pipes which generate a heat great enough to kill all insect life and the seeds of all weeds. This is a great advantage not only in the saving of weeding labor, but better results are secured in the seedlings which do not have to compete with weed growth and insects.

The tins into which the seedlings are transplanted are of various size and are rejects secured free of charge from local pineapple canneries. The bottoms are cut around on a specially devised cutter invented by the Forest Nurseryman, Mr. David Haughs, who during his long years of experience has invented many other labor-saving devices, such as a planting board, and is able to raise seedlings from good seed with 100 per cent. success.

The wood for the boxes into which seedlings are also transplanted was formerly imported entirely in the form of shooks from the Pacific Coast, but with the increased cost of lumber it has been found cheaper to buy up old packing boxes and remake them into trays of the standard size. Locally grown wood, such as the Norfolk Island pine and silk oak, from trees that have had



Gate at Government Nursery Made of Locally Grown Balk Oak Wood

to be removed from yards, have been sawed up at the nursery sawmill and made into very serviceable boxes.

In this manner, tree seedlings amounting to an annual average of over 350,000 during the past seven years, have been propagated and distributed throughout the Territory. Since June 1, 1919, when the rule prohibiting the shipment of trees in soil to other islands went into effect, the output of the Makiki Nursery has not been so great, but the capacities of the nurseries of the Board on the other islands have been increased to meet the demand for trees.

The Skinner system of irrigation has lately been installed at the Makiki Nursery. This consists of three horizontal pipes, running across the nursery above ground, from which the water emanates in small jets and falls on the plants in much the same form as rain. The installation of this automatic system has saved the time of one man who formerly had to water the plants with a hand hose.

The main output of this nursery consists of the well known trees which are in common demand and which have proved to be good growers. Among these are the three common eucalyptus—the blue gum, lemon-scented gum and swamp mahogany; the ironwood, pepper, Christmas berry; the pink, pink and white, and golden showers; yellow and royal poincianas, jacaranda, monkey-pod, silk oak, Monterey and Arizona cypresses, Japanese cedar, St. Thomas tree and pride of India. Lately there has also been a supply of Norfolk island pine and kauri pine seedlings available.

Among the indigenous trees distributed are the koa, williwili and milo. In limited quantities there are now available for distribution seedlings of the Tahitian kou, Tahitian kamani, the native halapepe and sumach, Australian red cedar, papaia, lime and orange, alligator pear, macadamia nut, St. John's bread or Egyptian locust, several species of the genus *figus*, and a variety of palms. Of special interest now on hand is a quantity of seedlings of the all-spice, an ornamental tree with very fragrant, spicy leaves.

A large quantity of vines, such as the Mexican creeper, the fast-growing *ipomea* with yellow blossoms, and Mauritius ivy, is grown and these are in the greatest demand on the army posts where it is desired to secure a quick-growing screen to buildings.

On the nursery grounds there are set out many varieties of hibiscus and oleander from which selections for cutting may be made. A large panax hedge also supplies cuttings for this most popular hedge plant.

A plot of Arizona cypress, juniper and Japanese cedar trees, in a small valley back of the nursery, supplies Christmas trees and decoration greens.

One section of the nursery is devoted to several varieties of basket willows to furnish cuttings of this plant, the product of which deserves greater attention as a possible minor industry in

this Territory. Of the other shrubs, a supply of crepe myrtle, ixora, cannas, and bamboos is kept on hand.

These trees, shrubs and vines are available to all at cost and no charge is made when they are planted for public purposes.

The same boiler which generates steam for the soil sterilizer runs the small steam engine which operates the sawmill. In this mill it is possible to cut up logs for posts and other sizes of lumber required in the nursery work. One of the products constructed from silk oak lumber turned out on this sawmill is shown in the accompanying illustration.

The Fire Menace

Owing to the protracted dry spell and lack of rain which has made the native forests on Oahu very dry and inflammable, the Chief Fire Warden of the Territory has deemed it necessary to prohibit, as provided by law, the starting of fires to clear land except by permit from the fire wardens. His official notice appears on the By Authority pages in this issue.

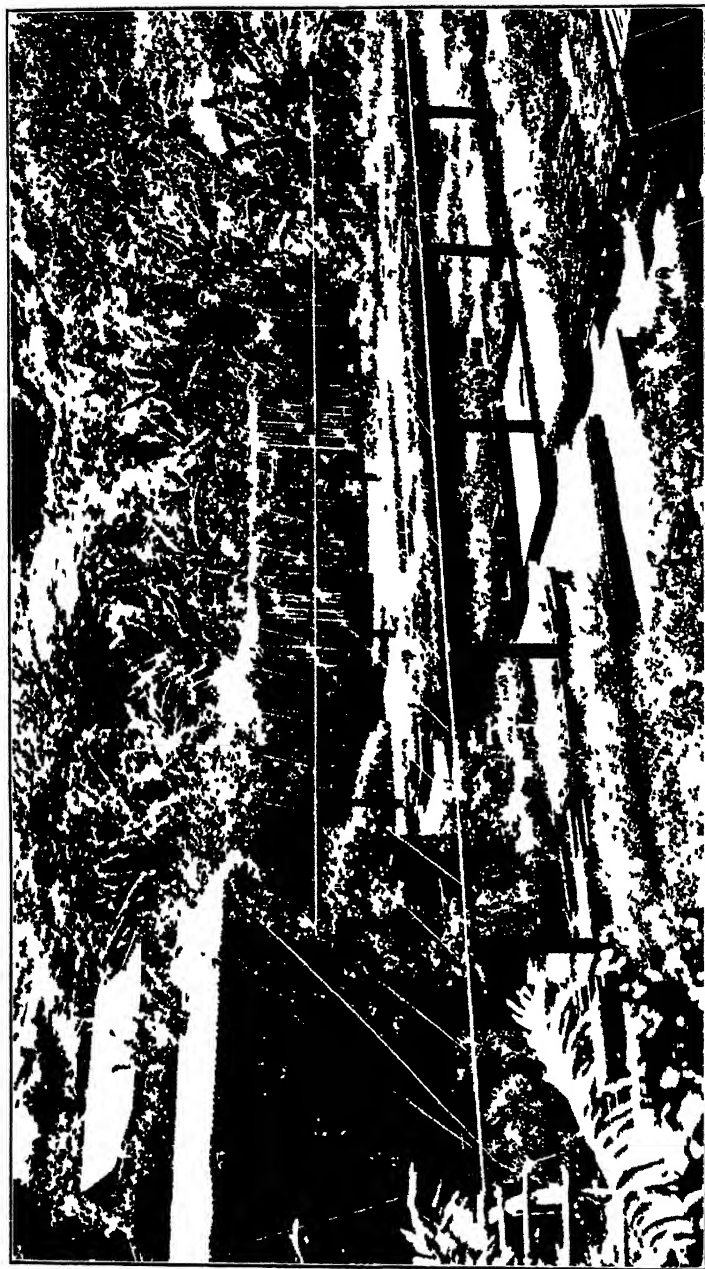
No permits to start fires will be issued where there is the least danger that the fire will spread to adjacent inflammable material and none of such fires are to be started when there is a high or dangerous wind blowing.

This prohibition applies to the whole island of Oahu.

Quarantine Justified

Under date of April 8, the "Breeders' Gazette" publishes the following over the initials W. N. L.:

"Kedron, General Pershing's war horse, recently was released from quarantine at Newport News, Va., by the Department of Agriculture. It will be remembered that efforts were made to have him released immediately after his arrival in order that Gen. Pershing might ride him in the triumphal parades in New York and Washington. The department took the position, however, that the menace to the live stock interests of the country was such that the release of even so distinguished an animal as Kedron could not be justified. While Kedron came through as sound as on the day of his departure for France, the wisdom of the quarantine has been established by the fact that other officers' mounts in quarantine at Newport News did develop dangerous diseases and two of them had to be destroyed. One of these had a contagious disease not known to exist in this country. The other had trypanosomiasis, an infectious blood disease, akin to



Mitiki Nursery Showing Skinner System of Irrigation

clourine, that is more or less prevalent in northern Africa and southern Europe. If the quarantine had not been established and these horses had been allowed to go free in the United States they probably would have been the means of spreading the diseases to such an extent that it would have been necessary to spend many thousands of dollars to eradicate the maladies, if they could have been eradicated at all."

Plant Inspection Rule Amended

The Board of Commissioners of Agriculture and Forestry, at a regular meeting held on May 4, 1920, voted to amend the new Rule XXI of the Division of Plant Inspection concerning the control of certain insect pests and plant pests in the Territory so as to allow the shipment inter-island and between localities on the same island of commercial ginger root. Since the ginger weevil has so far been found only on the root of the white ginger (*Hedychium coronarium*), it was decided to confine the prohibition to this part of this plant.

The amended rule, which was approved by the Governor on May 7, 1920, appears on the By Authority pages of this issue.

Divisional Annual Reports

DIVISION OF FORESTRY.

Honolulu, April 1, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

GENTLEMEN:—I have the honor to submit the following brief report covering the work of the Division of Forestry for the calendar year, 1919:

INTRODUCTION.

Considerable progress has been made during the year along the two main lines of work, forest protection and forest extension. With the work of setting aside new reserves completed and out of the way, it has been possible to give greater attention to the protection and reforestation of the established reserves. The present total area now in the 47 forest reserves, after the elimination on April 2, 1919, of 415 acres on Kauai for the Puu Ka Pele Park, amounts to 818,739 acres. Of this, 558,655 acres or 68% is government land.

A force of nine forest rangers is now employed on the four main islands who look out for the special needs of forestry in their respective districts, as well as the interests of forest protection in general.

FOREST PROTECTION.

By regular appropriation the work of fencing forest boundaries has progressed as much as the present high cost of material would justify and this has been augmented by cooperation with private owners and by requirements in general leases. In this manner a total of 7.79 miles of reserve boundaries have been newly fenced and 3.38 miles of fencing repaired, making a total of 11.27 miles receiving added protection as shown by the following table:

NEW FENCES IN 1919.

<i>Completed.</i>	<i>Island.</i>	<i>Reserve</i>	<i>Length in Miles.</i>
February....	Hawaii.....	Kau.....	1.00
March.....	Oahu.....	Makua.....	.84
March.....	Oahu.....	Makua.....	1.07
June.....	Hawaii.....	Kohala Mt.....	.13
July.....	Hawaii.....	Olaa Forest Park....	.30
August.....	Hawaii.....	Olaa Forest Park....	.19
September...	Mauai.....	Kula.....	2.68
October.....	Hawaii.....	Olaa Forest Park....	.28
December...	Mauai.....	Kula.....	1.40
			<hr/>
			7.89
			<hr/>

FENCES REPAIRED IN 1919.

February....	Kauai.....	Moloaa.....	3.00
October.....	Kauai.....	Papahalahola.....	.38
			<hr/>
			3.38
			<hr/>
Grand Total			11.27
			<hr/>

RIDDANCE OF WILD STOCK.

In addition to the driving out of wandering tame cattle from the reserves the following wild stock was killed within the forest reserves during the year: Goats 304, pigs 266, cattle 42, making a total of 612 head. This does not represent the total number thus eliminated from the forest reserves because the reports submitted are by no means complete. It is realized that this feature of pro-

tection is as important as fencing and permission to hunt is encouraged where damage to the forest will not result.

FOREST FIRES.

Owing to a very dry year there have been more fires than usual but fortunately none of them did any considerable or extensive damage to native forest growth. The following fires were reported:

February 27. Ohoikea Section of Kapapala Ranch, Kau, Hawaii. Fire burned over 1,500 acres of mostly grass land, but was extinguished same day by ranch cowboys and laborers from Pahala Plantation under Fire Warden James Campsie.

February 29. Wailau, at edge of Kau Forest Reserve, Kau, Hawaii. Fire of unknown origin burned 40 acres of forest land with considerable damage to undergrowth and a quantity of ohia trees. Men under Fire Wardens George Gibb and James Campsie soon extinguished it.

May 6. Pupukea Forest Reserve, Oahu. During some pineapple clearing a fire jumped the fire guard and burned over 40 acres of grass, damaging a few clumps of trees. Laborers working under Fire Warden F. S. Lyman extinguished it that night.

July 6. Lihue, Honouliuli, Oahu. A bee hive robber set fire to the grass with his smoking torch. The fire spread over 75 acres of grass land with practically no damage to trees. It was extinguished the same day by soldiers and pineapple laborers under Mr. A. W. Eames and Fire Warden A. A. Wilson.

July 6. A fire started on this day presumably by pig hunters burned over about 5,500 acres of pasture land in Kaohe and Kaholalele on the slopes of Mauna Kea, Hamakua, Hawaii, at an elevation of 5,000 to 7,000 feet, for a period of approximately two months before it was extinguished by rains.

August. During this month two small fires less than one acre in extent were extinguished at once by Forest Ranger Hardy in the Na Pali-Kona Forest Reserve, Kauai.

October 1. A grass fire on the ridge in Nuuanu Valley adjacent to the Country Club, started by brush burners, swept over an area of 20 acres of grass and brush land on the slope, but was extinguished in three hours by the fire department and men working under the Deputy Fire Warden at Large.

November 29. Wainiha, Kauai. A fire started along the ditch trail burned over a few acres of staghorn fern, but was soon extinguished.

FOREST EXTENSION.

Tree Nurseries.

This Division now maintains eight forest nurseries on the four main islands. Five of these are for the propagation of trees for

tree planting on forest reserves, while the other three are for general distribution and supplying the needs for tree planting on forest reserves, while the other three are for special reserve planting projects. In addition to these, arrangements have been perfected with the principal of the Kapaa School on Kauai whereby he will raise trees for general distribution to the children of the numerous homesteaders in that region.

On account of the new rule forbidding the shipping of trees in soil to prevent the spread of insect pests, provisions were made for supplying each of the main islands with trees from local nurseries. The existing nurseries on the other islands were somewhat enlarged and a new nursery, started at Haiku in April, was in good running order by fall and ready to supply the needs of Maui for trees.

Following is a list of the present tree nurseries:

Nurseries for General Tree Distribution.

Kauai, at Kalaheo in charge of Joe Rita.

Oahu, at Government Nursery, King street, and in Makiki Valley, Honolulu, in charge of Forest Nurseryman David Haughs.

Maui, at Haiku, in charge of Forest Ranger James Lindsay.

Hawaii, at Hilo, in charge of Bro. Matthias Newell.

Mountain Nurseries.

Oahu, Sugar Loaf, Mikilua, and Waiahole.

TREE DISTRIBUTION.

The number of trees distributed from the main nurseries during the past year was as follows:

Trees Distributed from Nurseries in 1919.

	Seedlings.	Trans-plants.	Pot Grown.	Total.
Oahu—				
Sold	1,000	450	1,732	3,182
Gratis				
Arbor Day			6,392	6,392
Forest Reserves	17,900	3,260	6,031	27,191
Homesteaders	3,000	1,300	4	4,304
Military Posts	19,200	5,913	2,093	27,206
Parks			52	52
Schools			80	80
Street Planting			949	949
Miscellaneous	24,000	9,000	3,084	36,084
Plantation Companies,				
etc.	103,000	16,300	10,936	130,236

Kauai . . . . .	.....	3,602	3,602
Maui	40,500	.....	40,500
Hawaii	6,303	6,000	12,303
Totals	208,600	42,526	40,955
			292,081

TREE PLANTING ON FOREST RESERVES.

During the year tree planting operations on forest reserves in need of reforestation have been extended. The planting of koa trees for watershed cover has been continued in the Makiki Valleys back of Honolulu and the planting of koa and other species for cover and protection has been continued in the Lualualei Forest Reserve at Mikilua. New planting projects were started at Keaau and Waiahole on Oahu. Planting on the Kealia Reserve and at Papapaholahola Spring, on Kauai, has also continued during the year. In this manner in spite of a comparatively dry year the following trees, totaling 32,648, were planted out on government lands on these two islands:

Trees Planted in Forest Reserves in 1919.

Koa	8,532
Red gum	6,482
Yellow poinciana	4,737
Ironwood	3,537
Bloodwood	2,212
Swamp mahogany	1,844
Silk oak	1,842
Monkey-pod	1,292
Mahogany	570
Miscellaneous	504
Logwood	496
Molave	330
Wiliwili	170
Blackwood	100

Total 32,648

The miscellaneous species consisted of the red sandalwood, wood oil tree, camphor, *Brassaia*, kassod, and sappan, which were set out in small quantities to test their adaptability to certain regions.

GENERAL TREE PLANTING.

Reports received from tree planters throughout the Territory which are not as yet complete show that during the year a total of 634,823 trees were planted on the several main islands, includ-

ing the reforestation projects of this Division. The plantings were distributed as follows:

Kauai	76,135
Oahu	171,439
Maui	319,103
Hawaii	68,146

Total number of trees planted. . . . 634,823

This is somewhat less than during the previous year, but can be accounted for by the very dry season which made planting inadvisable in many localities and by the increased cost of labor.

MISCELLANEOUS.

In addition to the two main lines of work described above this Division has rendered service to the community in other but related directions.

EDUCATION.

Besides giving advice on tree planting and the care of trees, which subject has largely been handled by the Forest Nurseryman, who has also cooperated with the Superintendent of Forestry in giving instructions and demonstrations on the same subject at the vocational school for soldiers at Schofield Barracks, the Superintendent gave a course of 12 lectures on elementary forestry and the Hawaiian forests at the Territorial summer school during August and later in the fall three lectures on forestry in Hawaii in the short course for plantation men at the College of Hawaii.

The working erosion model operated again at the Territorial Fair in June to illustrate the beneficial effects of a forest cover excited more than usual interest and favorable comment.

In addition to articles on forestry and specially described trees which appeared in the official monthly magazine of this Board, the Division published two new Botanical Bulletins by Consulting Botanist J. F. Rock: No. 5, "The Arborescent Indigenous Legumes of Hawaii," and No. 6, "The Hawaiian Genus *Kokia*."

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

Honolulu, April 15, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

GENTLEMEN:—I submit herewith, in compliance with the law, a brief report of the activities of the Division of Entomology in the annual period January 1st to December 31st, 1919.

The propagation and distribution of beneficial insects, particularly the fruit fly, horn fly and corn leaf hopper parasites, has been continued throughout the year and a tabulation below gives the number liberated.

No new field work has been undertaken, on account of the unsettled conditions abroad and poor transportation facilities, but through the cooperation of the California State Horticultural Commission a pupal parasite of one of the destructive cabbage insects (*Pieris rapae*—cabbage worm, imported cabbage butterfly) was received by mail from California, and has been propagated in our insectary, from which large colonies have been liberated in cabbage fields on Oahu and Hawaii. The establishment of the insect has not yet been determined.

Considerable time has been given to the study of the termites or white ants, which are becoming severely and alarmingly destructive with the increase and spread of two lately immigrant species.

An investigation was begun during the summer on the natural control of the dungflies in Hawaii with the purpose in mind of securing additional agents, if conditions warranted it, and so improving the control. These investigations remain incomplete, more urgent matters necessitating their suspension temporarily.

In September an infestation of the forest ferns by the Australian weevil *Syagrus fulvitaris* was discovered at 29 Miles from Hilo on the Hilo-Kau road. On account of the wealth of fern growth in this region and the importance of the ferns as part of the ground cover in the Hamakua forest reserve, it was decided to attempt to control the outbreak and prevent the spread of the weevil beyond the confines of the small area in which it was determined to be present. This necessitated the destruction of all ferns in the area as far as possible, which were cut and burned; thereafter, the ground cover was either fired or poisoned as far as possible to destroy crawling weevils, which might have escaped the initial treatment, and every vestige of fern plant on which the beetle could subsist; and an artificial barrier of crude oil was laid to contain the insect. At the same time an investigation was made of the weevil's history, habits, cyclical development, etc., which had not previously been done, although the weevil has been known in the islands fifteen years. This work has occupied the division almost exclusively during the re-

mainder of the year. The routine work of advising in regard to agricultural and stock pests, maintenance of collections, etc., however, has been adequately attended to.

A list of the publications of the Entomologist during the annual period follows:

1. Description of *Paranagrus osborni*, n. sp. (Hymenoptera, Mymaridae). Proc. Haw. Ent. Soc., v. 4 (1), p. 53.
2. Notes on Collection of Hawaiian Insects on Island of Maui (with W. M. Giffard). loc. cit., p. 50.
3. Control of the Melon Fly in Hawaii by a Parasite introduced from India. Proc. Third Ent. Meeting held at Pusa, India. Feb., 1918.
4. Report of the Entomologist. Biennial Report Board Agriculture and Forestry for period ended Dec. 31, 1918.
5. The Fern Weevil Menace. Hawaiian Forester & Agriculturist, v. XVII (1), p. 3.
6. New Genera and Species of Braconidae, mostly Malayan. (In press.)
7. Natural Control of Scale Insects in Hawaii. (In press.)
8. New Species of *Sicrola* with Explanatory Notes. (In press.)
9. A New Species of Fruitfly Parasite from Java (*Hymenoptera*). (In press.)
10. The Fern Weevil *Syagrius fulvitaris* Pasc. (In preparation.)
11. Notes on Termites or White Ants in Hawaii. (In preparation.)

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

TABULATION SHOWING THE LIBERATION OF BENEFICIAL
INSECTS, 1919.

	Oahu.	Kauai.	Molokai.	Maui.	Hawaii.	Total.
<i>Fruit Fly Parasites</i> .*						
<i>Galesus silvestri</i>	7,710	.....	.....	.....	.....	7,710
<i>Diachasma tryoni</i>	11,250	.....	.....	360	855	12,465
<i>Tetrastichus giffardianus</i> ..	25,875	.....	.....	700	2,100	28,675
<i>Dirhinus giffardi</i>	3,640	.....	.....	.....	.....	3,640
<i>Opius humilis</i>	6,050	.....	.....	40	810	6,900
<i>Diachasma fullawayi</i>	2,175	.....	.....	100	50	2,325
Total	56,700	.....	.....	1,200	3,815	61,715
<i>Melon Fly Parasite</i> :†						
<i>Opius fletcheri</i>	41,245	.....	.....	50	4,400	45,695

* Liberated at: Oahu—Nuuanu, Kaimuki, Moanalua, Waipahu, Makiki, Kalihi, Pearl Harbor, Pupukea, Wyllie Street, Manoa. Hawaii—Kohala, Kamuela, Honokaa, Hilo, Pepeekeo, Hawi. Maui—Wailuku, Paia.

† Liberated at: Oahu—Mōlīlī, Manoa, Lualualei, Makiki, Kaawa, Ft. Kamehameha, Wahiawa, Kailua, Pearl Harbor, Maunawai, Pupukea, Nuuanu, Kalihi, Waiāluā, Moanalua, Waipahu. Hawaii—Hilo, Kamuela, Pepeekeo, Glenwood, Kapoho. Maui—Wailuku.

*Corn Leaf Hopper**Parasite:†*

<i>Paranagrus osborni</i>	82,600	33,100	7,000	2,000	29,500	154,200
<i>Horn Fly Parasites:°</i>						
<i>Spalangia cameroni</i>	4,950	.....	....	2,350	.....	7,300
<i>Pachycrepoides dubius</i> ...	150	.....	....	....	.....	150
	<hr/> 5,100	<hr/>	<hr/>	<hr/> 2,350	<hr/>	<hr/> 7,450

DIVISION OF PLANT INSPECTION.

Honolulu, December 31, 1919.

Honorable Board of Commissioners of Agriculture and Forestry.
Honolulu, T. H.

GENTLEMEN:—I have the honor to submit herewith a brief report covering the activities of the Division of Plant Inspection during the calendar year 1919.

The work performed by the Chief Plant Inspector and his assistants during this period consisted of the following:

1. The general inspection and supervision of all fruit, vegetable, plant and seed shipments arriving in the Territory from the mainland of the United States and from foreign countries in order to prevent the introduction of insect pests and plant diseases which are injurious to agricultural interests in those countries.

2. The inspection of fruits, vegetables and plants, including sugar cane, taro, and lily root used for consumption, which are shipped from the Port of Honolulu to all ports of the other islands. The purpose of this inspection is to prevent, as far as possible, the spread of any insect pest or plant disease accidentally introduced on Oahu, of which Honolulu is the port of entry, to any of the other islands.

STAFF.

The undersigned has continued as Chief Plant Inspector during the year and has had the following assistants to perform the work of the Division: Mr. D. B. Langford, who acted as assistant inspector up to August 1, when he was granted a year's leave. Messrs. Edward Drew, Isaac Kahele Joshua and M. Mito, who have acted as inspector assistants and guards. Miss Ruth Seybolt has acted as clerk and stenographer. Brother Matthias

† Liberated at: Oahu—Makiki Nursery, Kalihi, Manoa, Wahiawa, Kailua, Schofield Barracks. Hawaii—Kohala, Hawi, Kamuela. Kauai—Lihue, Kealia, Kilauea. Maui—Kula. Molokai—Pukoo.

° Liberated at: Oahu—Wahiawa, Maunawai, Moanalua, Pearl Harbor. Maui—Paia.

Newell has continued as fruit and plant inspector at the Port of Hilo, and Mr. Will J. Cooper as inspector at the Port of Kahului and other landings on Maui.

The following honorary inspectors have been serving the Division on the other islands: Mr. E. E. Madden, Mahukona, Hawaii; Mr. George B. Leavitt, Eleele, Kauai, and Mr. G. C. Munro, Keomuku, Lanai.

EQUIPMENT.

The equipment remains the same as last year, but it was found necessary, owing to faulty construction, to make some necessary repairs to the floors of the main building, which settled and cracked, and also to raise the floors in the fumigating rooms. These were on a level with the yard floor and during heavy rains the water would enter under the doors.

The last legislature provided ample funds for further improvements. The roofing over the yard between the main and rear building is necessary, for in rainy weather we have had trouble in keeping deliveries for the fumigating vaults dry. It is also contemplated to put an addition to the rear building into which will be placed a vacuum fumigator. This will be very useful for the fumigation of dense materials into which the ordinary gases or fumes cannot penetrate sufficiently to guarantee absolute safety.

The additional land which has been set aside by the Governor's proclamation will allow us more room for other buildings in the future and we can now fence in the property with a high fence and necessary gates which will prevent the loitering of undesirables around the premises.

WORK PERFORMED.

During the year 1919 we inspected 838 vessels arriving at the Ports of Honolulu, Hilo and Kahului. Of these 298 vessels carried vegetable matter, consisting of 11,728 lots and 263,331 packages. Of these 246,619 packages were fruits and vegetables, chiefly from the mainland of the United States and imported as food for local consumption; 2,158 packages were seeds of trees, shrubs, flowers, vegetables and cereals, and 6,665 packages were plants and roots.

Out of all these shipments, 810 packages were destroyed, having been found infested with serious pests or being contraband shipments under rulings of the Federal Horticultural Board of Washington, D. C.; 6,220 packages were fumigated before delivery, either on account of slight infestation with pests already here in the islands or as a precautionary measure, and 42 packages were refused entry, either being returned to the shipper or sent back on board the vessel bringing them.

RICE AND BEAN SHIPMENTS.

During 1919, 209,289 bags of rice and 31,757 bags of various kinds of beans arrived in the Territory through the Ports of Honolulu and Hilo from Japan and China ports. All these shipments were thoroughly inspected and found free from cereal pests. A thorough understanding and cooperation with the authorities at Japanese ports in regard to enforcing Rule III of the Board of Agriculture and Forestry has done much to prevent infested shipments being made. However, on account of infested shipments of rice and beans destined to mainland ports being placed in the hold of the steamer carrying shipments for Hawaii, there is always an uncertainty of clean shipments arriving. Our splendid equipment in Honolulu could readily handle infested shipments, but not so at Hilo, where occasionally shipments go direct on steamers of the T. K. K. South American line. From allotted funds we contemplate erecting a large fumigating vault at Hilo for the purpose of handling infested shipments should such be found in the future.

INTER-ISLAND INSPECTION.

During 1919 we have continued the inspection of horticultural products shipped from Honolulu to all other island ports. On June 1, Rule XX of the Division of Plant Inspection went into effect. As this rule prohibits the taking of soil, earth or sand attached to the roots of plants, we have been very careful not to allow any plant shipments to leave Oahu until they have been thoroughly inspected and all soil washed from the roots. Since the discovery of the Australian fern weevil on Hawaii, and a ginger weevil on Oahu, we have stopped all fern and ginger plant shipments to the other islands.

Seven hundred and four steamers plying between Honolulu and ports of the other islands were attended to during the year and 41,461 packages of plants, fruits, vegetables and sugar cane were inspected. Of this number 182 packages were rejected either on account of infestation or as not complying with the regulations of the Board.

FEDERAL HORTICULTURAL BOARD.

On June 1, 1919, the Federal Horticultural Board of Washington, D. C., published and passed Notice of Quarantine No. 37, with regulations. These regulations govern the importation of nursery stocks, plants and plant products from foreign countries. Regulation 3 enumerates the classes of plants which may be imported for propagation *under permit* and in compliance with the other requirements of the regulations. All shipments must be free from sand, soil or earth. Since the passing of these regula-

tions very few shipments of plants and seeds have entered the Territory and all shipments which do not conform with the regulations are seized and destroyed. Owing to two serious plant diseases (Flag smut and Take-all) attacking various cereals, the latter known to exist in Australia, Germany, Belgium, Italy, France, Great Britain, Ireland and Brazil, and the former known to exist in India, Japan and Australia, all seed or paddy rice, wheat, oats, barley and rye in the raw, uncleaned or unprocessed state for planting, is prohibited from entry into the United States or its Territories from any of the above countries under Quarantine Notice No. 39.

PESTS INTERCEPTED.

During the year a number of dangerous insect pests and fungous diseases were intercepted in the course of inspection. Chrysanthemum plants from Japan were seized and burned on account of a Lepidopterous borer in the stems. A package from Porto Rico containing taro which showed signs of a disease was destroyed by burning. Fig trees from Japan were infested with larvae of a wood-boring beetle (Cerambycidae); gladiolus bulbs infested with Aphis; peas from Japan infested with the Pea Weevil (*Bruchus pisorum*); loquat seeds from Japan infested with weevils, and various scale insects, all of which were found on plant shipments.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, April 19, 1920.

Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

GENTLEMEN:—I have the honor to submit the following brief report covering the work of the Division of Animal Industry for the calendar year 1919.

IMPORTATIONS OF LIVE STOCK.

The following live stock were imported into the Territory:

Horses	218
Mules	316
Cattle	114
Sheep	50
Swine	11
Dogs	51
Cats	2
Poultry	515 crates

With the exception of fifty sheep and a few dogs, which came from New Zealand, all the rest came from the mainland of the United States and all were subjected to either quarantine, rigid inspection, tuberculin or mallein test, dipping or disinfection before being admitted to the Territory, and it may safely be said that, with the exception of a few cases of incipient tuberculosis which were apprehended later, no disease gained entrance with them. Excepting a few race horses, polo ponies and stallions the horses and mules were principally army animals, while the cattle, sheep and swine were either dairy cows or purebred breeding stock.

During the year the rules and regulations governing the importation of live stock were revised and much strengthened, while certain restrictions were placed on cattle in inter-island traffic.

CONTROL OF LIVE STOCK DISEASES WITHIN THE TERRITORY.

The great *anthrax* epidemic of 1917, which cost the Territory and its live stock industry in the neighborhood of one hundred thousand dollars, has been completely suppressed in so far as Oahu and Maui are concerned. On these islands no case occurred during the year and vaccination was discontinued. On Kauai one case occurred and vaccination of all animals on the principally infected ranch is still carried on.

The eradication of *bovine tuberculosis* has been vigorously prosecuted during the past year. The new indemnification act passed by the 1919 Legislature has proved very effective, especially in simplifying the appraisal of condemned animals, in allowing more liberal compensation and in authorizing the testing of beef cattle when tuberculosis is suspected. Without this latter measure all efforts at complete eradication would have proved ineffective. As it is the number of dairies free from tuberculosis is steadily increasing and the number of affected animals encountered is diminishing fast. Furthermore, the persistent objection of certain dairymen to have their herds tested regularly has practically disappeared.

Neither *glanders* nor *epizootic lymphangitis* in horses or mules has been encountered during the past year, nor has *hog-cholera* been reported. A few outbreaks of *swine plague* (hemorrhagic septicemia) have occurred, but when promptly reported they have been easily controlled by vaccination.

An apparently new disease or a new form of an old disease, *tongue paralysis* in cattle, may possibly prove to be a chronic form of hemorrhagic septicemia. Should this prove to be the case the Division is well prepared to control its further spread.

ANIMAL INDUSTRY REVOLVING FUND.

An act appropriating \$5,000.00 for the purpose of purchasing

and distributing at cost serums, vaccines and similar biologic remedies was passed by the 1919 legislature. Under its provisions this office now keeps on hand in sufficient quantities to check an outbreak such bacterial preventive and curative remedies for diseases of animals as, owing to easy deterioration, cannot be carried by the local druggists.

Among such diseases may be mentioned anthrax, hemorrhagic septicemia in horses, cattle and swine (swine plague), infectious abortion and metritis in cattle and keratitis (pink eye) in cattle. The remedies are distributed through and applied by the deputy territorial veterinarians who collect for the same and remit to the Animal Industry Revolving Fund through this office.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

Division of Forestry

Honolulu, April 19, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of March, 1920:

TREE PLANTING.

During the month 687 koa trees were planted on the Honolulu Watershed Reserve in Makiki, and at Mikilua, in the Lualualei Reserve. 993 koa trees and 2,673 red gum trees were set out, making a total of 4,353 trees planted. At the Waiahole Nursery several thousand red cedar seedling trees were transplanted into tins.

Several pounds of good koa seeds were received from Kauai during the month. Arrangements for securing these were made through Ranger Hardy.

FOREST FENCING.

One-half mile of American fence wire was sent to the Raymond Ranch which has agreed to erect the same and close up the gap between Kana-hau and Kalepeamoa. This will give the Kula Forest Reserve on Maui complete protection from wild cattle on the Kahikinui side and the contemplated tree planting can then begin.

ANNUAL REPORT.

A portion of the month was spent in the preparation of the annual report for this Division, which is submitted at this time.

HAWAII AND MAUI TRIP.

From March 20 until the end of the month, I was on Hawaii and

Maui, as a special representative of the Territory detailed by the Acting Governor to accompany Mr. H. M. Albright, Field Assistant to the Director of the National Park Service on an official trip to the Hawaii National Park. The principal points of interest visited were Kilauea, the Kau flow, Puuhuluhulu, Puu Ulaula, at an elevation of 10,300 feet on Mauna Loa, and Kona, on Hawaii, and Iao Valley and Haleakala on Maui. I also give Mr. Albright assistance by securing maps and information pertaining to the pending acquisition of private lands within the Kilauea Section and to government lands for the purpose of enlarging the present area of this section.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, April 16, 1920.

Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—I herewith submit a report of the work done during the month of March:

NURSERY.

Distribution of Plants—

	Seed Boxes.	Transplant Boxes.	Pot Grown.	Total.
Sold . . . . .	.....	50	74	124
Gratis (including forest reserve)	22,000	500	898	23,398
Total	22,000	550	972	23,522

COLLECTIONS.

Preservation Forest Reserves—

Black Sand.

March 31.

145 loads black sand taken from Makiki Sand Pit at 50c. \$ 72.50
Charcoal.

16 bags charcoal including commission, Terr. Market... 8.92
Rents and Fees.

Rent of premises at Halfway House, Tantalus, for quarter ending March 31, 1920, at \$10.00 per month.... 30.00

Fees for use of land and gathering ti leaves, Kalawahine, Pauoa Valley, for quarter ending March 31..... 12.50
Camp Sites—Kokee Camp, Kauai.

Rental fees for period from January 1 to December 31, 1920, Camp Sites Nos. 1, 23, 84, 14, 46, 18..... 113.00

\$236.92

Government Realizations—

Collections on account of plants sold.....	\$30.75
(Including \$25.00 from Joe Rita, Jr., for plants sold at Papapaholahola Spring, Kalaheo, Kauai.)	
Rent of Office, Nursery Grounds for February.....	35.00
	<hr/>
	\$65.75

Animal Industry Revolving Fund—

Mar. 31—To 5 gals. disinfectant delivered to George J. Brown, Kalihi Farm	\$12.50
To Hemorrhagic septicemia vaccine for cattle, J. W. Reis.....	17.10
	<hr/>
	\$29.60

MAIKIKI STATION.

The work done at this station during the month consisted of the mixing and sterilizing of soil, transplanting and potting plants, etc.

HONOLULU WATERSHED.

A total of 687 koa trees were planted on land behind Sugar-loaf hill and adjoining the Schmidt estate on Sugar-loaf side.

HAIKU NURSERY, MAUI.

Mr. James Lindsay reports the following distribution of plants from the Haiku Nursery:

	Seed Boxes.	Transplant Boxes.	Pot Grown.	Total.
For the year 1919.....	40,500	...	...	40,500
“ January, 1920	3,450	...	...	3,450
“ February, 1920	5,500	271	...	5,771
“ March, 1920	1,000	2,400	29	3,429

HILO NURSERY, HAWAII.

Bro. M. Newell reports that he distributed from the Hilo Nursery 420 plants in transplant boxes and 76 pot grown—total 496 plants.

KAUAI NURSERY, PAPAPAHOLAHOLA SPRING, KALAHEO,
KAUAI.

Joe Rita, Jr., reports that he distributed 300 Eucalyptus robusta during the month of March.

ADVICE AND ASSISTANCE.

The writer has been called upon to visit and assist the officers at the following military posts in planting and laying out their grounds: Fort Armstrong, Fort Kamehameha, Fort Ruger, Pearl Harbor Hospital, Luke Field, Ford Island. We have supplied a number of plants to each post and are propagating more to be given when ready.

At Luke Field there is practically nothing in the line of plants and the officers are very anxious to have the place made beautiful and greatly appreciate any plants and assistance we may be able to give them.

A cordial invitation from Captain Olds, assistant to the Commanding Officer, Colonel Curry, is extended to members of the Forestry Division

to take advantage of any assistance they may be able to give in aiding us in the forestry work. The use of their planes this gentleman assured me would gladly be given for the purpose of examining the forests on the mountains of Oahu or in the case of fires, etc. I am personally indebted to Colonel Curry and his officers for courtesies received while visiting and especially for the very pleasant trip in an aeroplane with Lieut. Elliot from Luke Field to Kapiolani Park.

The writer has, at the request of people in and around the city, made the following number of calls and otherwise given advice and assistance as follows:

Calls made	8
Advice by phone.....	5
People calling	8

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, April 16, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of March the insectary handled 22,400 pupae of the melon fly, from which there were bred 3,410 females and 3,044 males *Opius fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opius fletcheri.

	Females.	Males.
Oahu:		
Waianae	750	750
Keaau	1,600	1,600

FRUIT FLY PARASITES.

Diachasma fullawayi.

Oahu:		
Kalihi Valley	150	150
Nuuanu	260	230

Tetrastichus giffardianus.

Oahu:		
Kalihi Valley.....	...	600
Nuuanu .....	...	1,500

Opius humilis.

Oahu:		
Kalihi Valley	100	100
Nuuanu	100	100

Diachasma tryoni.

Oahu:		
Nuuanu	200	200
Kalihi	250	250

Galesus silvestri.

Oahu: Nuuanu Avenue.....	...	1,900
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Dirhinus giffardi.

Oahu: Nuuanu	900
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During the latter part of February and the entire month of March the entomologist was engaged at 29 Miles, Olaa, Hawaii, superintending the work authorized by the Board and intended to eradicate the fern weevil in that locality. It will be recalled that the work done in January was only calculated to contain the weevil in the original area of infestation and left a considerable part of the interior to be cleared and scarified. This had been roughly done earlier but the effort was entirely inadequate, the principal defects being (1) failure to destroy the fern stumps, (2) to kill the weevils which had fallen to the ground when the ferns were cut, and (3) to treat tree ferns and epiphytic ferns. It was planned on this occasion to clear the area thoroughly and completely of all ferns, so that there would be absolutely no material on which the weevil could live for a considerable period, and to treat the ground cover with poison in such a manner that all straggling weevils would be killed and the chance of their escape from the area obviated. Opposition was encountered at once in attempting to carry out this plan, the objection to it being that it was too drastic and unnecessarily interfered with the natural rights of property owners on the infested area. The land under the control of the government was treated as originally contemplated, although it ruined the koa part, but in dealing with the property owners it was considered necessary to compromise in order to avoid damage suits, and the work on the residence lots was not as complete and thorough as it should have been. One of the property owners elected to perform the Board's requirements personally and in view of the fact that the labor commanded was hardly adequate for the entire job, no objection was interposed, but it was stipulated that the work should be done satisfactorily and promptly as the law provides. The arrangement has, however, not proved good, as the person has been unable to secure the necessary labor and the work has been delayed. It is expected that by exerting pressure on this delinquent the work can be hurried and that by careful attention the situation can be daily improved and sooner or later mastered. It was impossible to find evidence of any new infestation, which is a fortunate circumstance.

The actual work performed during this period is as follows:

Koa grove—Thoroughly cleared and sprayed with arsenite of soda.

Deyo lot—Thoroughly cleared and sprayed with arsenite of soda in the rear portion. Middle portion sprayed during rainy weather. House lot, sprayed all ferns that could be found, spared all large ferns and flowers.

Bowman lot—Received the same treatment as the Deyo lot.

Kennedy lot—Sprayed during rainy weather.

Shipman lot—The area around lava tubes and a part of cow pasture, which Mr. Shipman fenced, was sprayed, partly during rainy weather. The hog pasture has not been sprayed. The house lot and cow pasture mauka of the house has not been sprayed. The ferns here are very sparse and are being hand-picked as often as convenient.

English lot—Referred to above. Not touched, on account of owner's election to treat it himself.

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, March 31, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of March, 1920, as follows:

During the month 70 vessels arrived at the Port of Honolulu, 18 of which carried vegetable matter and 15 vessels came through the Panama Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	1107 lots	16,067 pkgs.
Fumigated.....	16 "	16 "
Burned	57 "	57 "
Returned	2 "	104 "

Total Inspected..... 1182 " 16,244 "

Of these shipments 15,810 packages arrived as freight, 252 packages as mail and 182 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 9864 bags of rice from Japan, 2000 mats of rice from China, and 1820 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 3315 pieces of baggage belonging to immigrants from foreign countries were examined, from which 42 lots of fruit and 14 lots of vegetables were seized and destroyed.

On March 9, per *Manoa*, a package of seeds from Portugal in the mail was fumigated as a precaution.

On March 14, per *Korea Maru*, a package of pili nuts in the baggage of an immigrant from Manila was seized and destroyed on account of infestation. In the postoffice was found a package of bulbs from Manila and a package of rice paddy from Japan which were seized and destroyed. A bag of rice paddy in the cargo from Japan was seized and is being held pending disposal by the custom house. A package of tree seeds in the mail from Java for Dr. H. L. Lyon was fumigated as a precaution.

On March 18, per *Venezuela*, a package of rice paddy in the mail from Japan was seized and destroyed. A package of seeds from Java for Dr. H. L. Lyon by mail was fumigated as a precaution.

On March 20, 12 coconuts from Fanning Island were fumigated as a precaution.

On March 23, per *Lurline*, a plant in the American Railway Express was fumigated on account of plant lice.

On March 30, one lot, consisting of 100 bags of potatoes consigned to California Feed Company from San Francisco, was returned, being badly infested with potato scab.

HILO INSPECTION.

Brother M. Newell, inspector at Hilo, reports the arrival of six steamers at the port of Hilo. Two carried vegetable matter consisting of 82 lots and 1911 parcels, all passed.

KAHULUI INSPECTION.

Mr. Will J. Cooper, inspector at Kahului, reports the arrival of five vessels at the Port of Kahului. Two carried vegetable matter consisting of 11 lots and 692 packages, all passed as free from pests.

INTER-ISLAND INSPECTION.

Sixty-one steamers plying between Honolulu and the other island ports were attended and the following shipments passed as free from pests:

Taro	607 packages.
Vegetables	376 "
Fruit	242 cases.
Plants	71 packages.
Seeds	10 "
Pineapple Shoots	1155 bags.
Sugar Cane	80 cases.

Total Passed.....2541 packages.

Thirteen packages of plants and eight pieces of sugar cane were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Citrus Canker: I beg to report the discovery of citrus canker in a small orange grove belonging to M. Kawahara up Kalihi valley. When Prof. S. I. Kuwana, director of the Imperial plant quarantine station at Yokohama, Japan, visited us in January, he was invited by Mr. Kawahara to visit his place in Kalihi. On his return to my office he brought some leaves of citrus which showed a brownish fungus. Neither of us could say what it was and he suggested sending it to Dr. Karl F. Kellerman of the Federal Horticultural Board, Washington, D. C., who has charge of the work. On March 16 I received a cable from him as follows:

"Grapefruit leaves sent January by Kuwana infected citrus canker. I visit Hawaii May and can cooperate in control or eradication work. Cable immediately extent infected groves and precautions taken to prevent spread."

I notified Mr. Judd, Executive Officer, and we at once visited Mr. Kawahara's place. We found about 35 young grapefruit trees infected and ordered them dug up and burned at once. Mr. Kawahara received these trees from a friend who lives at Palier, Fresno county, Cal., having bought them from a nurseryman in that locality. I visited Mr. Kawahara's place a couple of days after ordering the trees dug up and burned and found that my order had been carried out. I then sent the following cable to Dr. Kellerman:

"Only 35 young trees infected. Originally shipped from Fresno, Cal., 1916. Ordered burned. Nothing alarming; explain by letter."

I also have notified the horticultural quarantine officer and the Director of Agriculture of California about this matter as I consider it very important to know that such trees came from Fresno county. I plan to continue my inspection of the Kawahara orchard as well as to carry on an inspection of Kalihi Valley and other localities. Now that we know what citrus canker looks like it will be easy to discover any appearance of the disease.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, April 19, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to submit herewith my report on the work of the Division of Animal Industry for the month of March, 1920:

TONGUE PARALYSIS IN CATTLE.

For the past year or more a strange disease has been reported as appearing first on Molokai, later on Lanai and more recently on Maui and in the Kona district of Hawaii. The disease is characterized by the partial paralysis of the tongue, which interferes with the prehension and deglutition. As a result of this the affected animals become emaciated and finally die. On post-mortem examination nothing typical has been found except that the various stomachs contained poorly masticated food.

The last outbreak reported—the one from Maui—where Dr. Fitzgerald had made post mortem examination of three typical cases, would seem to be a form of hemorrhagic septicemia, as he found bloody exudations in the chest cavity and discolorations on the heart.

As enlargement of the tongue has been mentioned in a report from Africa as occurring in hemorrhagic septicemia, it seems likely that this is the disease we are dealing with here. An enlarged tongue and a paralyzed tongue both protrude from the mouth and may easily be mistaken for each other.

Experiments are now under way to attempt to cure some of the typical cases with the hemorrhagic septicemia serum which we have on hand.

INFECTIOUS ABORTION IN CATTLE.

This insidious and very destructive disease has unfortunately made its appearance in two dairy herds in Honolulu.

Dr. Rowat reports abortion very prevalent in South Kona, but states that the cattle owners believe it due to certain poisonous plants of the *Salvia* family.

We have obtained abortion bacterins as well as curative serum and are now treating the affected herds apparently with success.

SWINE PLAGUE.

A large herd of swine at Watertown have developed swine plague. Unfortunately the owner failed to report it until about 75 head had died. Vaccination with swine plague bacterins and the administration of neobacillosis powder in the food put an almost immediate stop to the outbreak.

TUBERCULOSIS CONTROL.

In spite of the very heavy infections met with in the Waialae and Wailupe districts, the total number of reactors for the past year will fall below 1¼%. The most important question now would seem to be the complete eradication of the disease from the Wailupe district. The matter is under consideration and the Division is ready to proceed as soon as the required facilities for a complete round-up have been provided.

DOGS ON BOARD U. S. VESSELS.

Copies of correspondence addressed to the commanding officer at the naval station at Pearl Harbor, to the commander of the Honolulu naval yard and to the officer in charge of the U. S. transport service are appended for the Board's information.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

Territory of Hawaii, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii, April 8, 1920.

Dr. V. A. Norgaard, Territorial Veterinarian, Honolulu.

Dear Sir:—President Rice has directed that you take the necessary steps concerning the dogs on board the destroyers and cruisers now in port.

Very truly yours,

(Sgd.) C. S. JUDD,
Executive Officer.

April 7, 1920.

From: The Board of Commissioners of Agriculture and Forestry.

To: Officers in Charge of the U. S. Transport Service, Port of Honolulu.

Subject: Bringing Dogs into the Territory on U. S. Transport in Contravention of the Regulations of this Board.

Sir:—Your attention is called to the following facts:

1. Rabies or hydrophobia remains prevalent among dogs and other animals on the mainland of the United States, and especially in the Pacific Coast and Nevada.

2. Rabies can only gain entrance into this Territory, where it has never yet occurred, by means of dogs and other animals, generally referred to as "mascots," introduced in contravention of Rule VIII of this Board (copy enclosed) and which requires that such animals be quarantined for one hundred and twenty (120) days before admission to the Territory.

3. Within the past year officers of this Board have twice apprehended dogs on transports (transport Sherman, April 13, 1919, and the transport Logan, February 15, 1920), which undoubtedly would have gained entrance here except for unofficial information reaching said officers, leading to the apprehension and quarantine of the animals.

4. In both cases neither the Master nor the quartermaster agent on board had any knowledge of the presence of these animals on board.

5. In the case of the transport Sherman the quartermaster agent on board stated that it was impossible for him to enforce the department quartermaster's regulations forbidding the presence on board of dogs or other animals on the transport.

6. The Territorial Veterinarian and his assistant and inspectors have reason to believe that the two cases specified above constitute but a fraction of similar attempts which have succeeded.

7. Your attention is called to the correspondence on the same subject between your office and that of the Territorial Veterinarian of

this Board, dating from August 13, 1914, and subsequent dates, which undoubtedly you have on file in your office.

b. Your cooperation in the enforcement of the regulation referred to and which it is believed is imperative in preventing rabies or hydrophobia from gaining entrance into the Territory, is respectfully requested.

BOARD OF COMMISSIONERS OF AGRICULTURE
AND FORESTRY,

By its President,
(Sgd.) A. H. RICE.

Deputy Zone Supply Office, 13th Zone, Honolulu, T. H., 15 April, 1920.
From: Office Deputy Port & Zone Transportation Officer.

To: Board of Commissioners of Agriculture and Forestry, Honolulu,
T. H.

Subject: Bringing dogs into the Territory on U. S. A. Transports.

1. Reference your letter of the 7th inst., subject—"Bringing dogs into the Territory on U. S. Transports, in contravention of the regulations of this Board." A copy of your letter has been forwarded to the port and zone transportation officer, Fort Mason, San Francisco, California, with the request that the necessary instructions be issued to all those concerned.

2. This office will keep a sharp look-out for any dogs that may arrive on transports and your office will be immediately informed in the event any dogs are apprehended so that they may be taken and quarantined for the prescribed period before being admitted into the Territory.

By authority of the port and zone transportation officer:

(Sgd.) A. H. DAVIDSON,
Captain, Cavalry, Assistant.

April 9, 1920.

From: The Territorial Veterinarian.

To: The Commanding Officer, Naval Station, Pearl Harbor.

Subject: Dogs and Other Animals Aboard U. S. Vessels in Territorial Waters.

Sir:—Your attention is called to the following:

1. About a year ago the Territorial Veterinarian was assured by the Commanding Officer, U. S. Naval Station, Pearl Harbor, of his cooperation in enforcing Rule VIII of the Division of Animal Industry, entitled "Dogs on Board Steamers and Other Vessels" (copy enclosed).

2. On the 1st instant, an inspector from this office delivered at the office of the Assistant Captain of Yard, Naval Station, Honolulu, thirty-five (35) copies of this rule, with the request that they be furnished to the commanding officer of each of the vessels of the visiting fleet.

3. A dog has been lost from the U. S. S. Rizal, or rather from the coaling dock along which the Rizal was moored.

4. The dog should not have been allowed ashore.

5. Copy of a letter addressed to the officer in charge of the U. S. Transport Service, Port of Honolulu, is enclosed for your information.

6. The Board of Commissioners of Agriculture and Forestry respectfully request your cooperation in enforcing Rule VIII.

(Sgd.) VICTOR A. NORGAARD,
Territorial Veterinarian.

April 9, 1920.

From: The Territorial Veterinarian.

To: The Assistant Captain of Yard, Naval Station, Honolulu.

Subject: Dog from U. S. S. Rizal Escaped from Coal Docks.

Sir:—Your attention is respectfully called to the following:

1. On April 1, an inspector from this office when attempting to deliver on board copies of Rule VIII of this Division, pertaining to the presence of dogs on board steamers and other vessels, the officer of the dock referred him to your office where he delivered thirty-five (35) copies of said rule, with the request that the same be delivered to the commanding officer of each of the vessels of the visiting fleet.

2. A dog has been lost from the U. S. S. Rizal, or rather from the coaling dock along which the Rizal was moored.

3. The dog should not have been allowed ashore.

4. Copy of a letter addressed to the officer in charge U. S. Transport Service, Port of Honolulu, is enclosed for your information.

5. The Board of Commissioners of Agriculture and Forestry respectfully request your cooperation in enforcing Rule VIII.

(Sgd.) VICTOR A. NORGAARD,
Territorial Veterinarian.

U. S. Naval Station, Hawaii, Pearl Harbor, T. H., April 9th, 1920.
Dr. Victor A. Norgaard, Territorial Veterinarian, Box 207, Honolulu, T. H.

Dear Sir:—In reference to your letter of April 7th, 1920, in regard to the copies of Rule VIII, they were received at this office and promptly forwarded to each vessel in the harbor.

Yours truly,

(Sgd.) S. WATSON.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, April 20, 1920.

Dr. V. A. Norgaard, Chief, Division of Animal Industry, Honolulu.

Sir:—I beg to submit the following routine reports for the month of March:

TUBERCULOSIS CONTROL.

The following cattle were tested during the past month:

	Tested.	Passed.	Condemned.
O. R. & L. Co.....	418	418	0
F. S. Lyman.....	38	38	0
O. R. & L. Co.....	142	142	0
American Factors, Ltd.....	1	1	0
C. A. Long.....	33	33	0
J. H. Cummings.....	12	12	0
V. Souza	8	8	0
F. Fernandez	1	1	0
Akiona Afong	2	2	0
D. Barriomebo.....	1	0	1
M. Pogan	1	1	0
H. Kobelauski	2	2	0
Jose Lario	1	1	0
A. S. Kenway.....	2	1	1
A. Reinicke	7	7	0
Capt. Hartman	3	3	0
T. Nakamoto	37	36	1
Fred Luning	14	13	1
A. Pacheco	1	1	0
M. H. Sanders	3	3	0

M. T. Brazon.....	41	39	2
C. Oshiro	32	31	1
A. Boniza	12	12	0
T. Nakamura	36	36	0
Himen & Freitas.....	24	24	0
A. Lopez	12	12	0
Pedro Deas	12	11	1
J. Simon	3	3	0
A. Compos	15	15	0
J. Himers	13	13	0
C. Borozo	17	17	0
M. Salado	7	7	0
S. Hirata	43	43	0
A. Beis	35	34	1
P. Martinez	18	18	0
R. Hind	12	12	0
D. Yamashita	52	51	1
Shimabuku	25	23	2
J. Horrillo	10	10	0
J. Himeni	36	36	0
S. I. Shaw.....	14	12	2
S. K. Maii.....	2	2	0
M. T. Brazon.....	2	2	0
M. S. Teixeira.....	2	2	0
R. Tomita	5	5	0
On Young	216	210	6
Waialua Plantation Co.....	8	8	0
O. R. & L. Co.....	418	410	8
Oscar Cox	2	2	0
O. R. & L. Co.....	20	20	0
American Factors, Ltd.....	4	4	0
S. Shimidsu	26	26	0

From the above list it will be seen that a total of 1901 head of cattle were tested, out of which number 1873 were passed and 28 condemned, branded and slaughtered.

Besides the above testing, 28 condemned cattle were post-mortemed at the Punhale abattoir, all of which were found affected with tuberculosis.

IMPORTATIONS OF LIVE STOCK.

During the past month the Live Stock Inspector boarded 20 vessels, of which number the following were found to carry live stock for this Territory:

- S. S. Hyades, San Francisco: 1 bull, American Factors, Ltd.
- S. S. Manoa, San Francisco: 4 Hampshire hogs, J. H. Wilson; 45 cts. poultry.
- S. S. Cawthorn, Orient: 5 chow dogs, Mr. Lillis; Mr. Kennedy and Mr. T. M. McGuire.
- S. S. Wilhelmina, San Francisco: 1 dog, R. A. Ducoe.
- S. S. Lurline, San Francisco: 1 dog, Major Clement; 12 mules, American Factors, Ltd.; 4 Hereford bulls, American Factors, Ltd., 20 mules, City Mill Co.; 2 Berkshire hogs, College of Hawaii.
- S. S. Lurline, San Francisco: 2 hogs, Hawaii Meat Co.; 56 cts. poultry, Various; 10 mules, Haiku F. & P. Co., Maui.
- S. S. Sonoma, San Francisco: 1 dog, S. S. Paxson.

Respectfully submitted,

LEONARD N. CASE,
Asst. Territorial Veterinarian.

By Authority

PERMITS TO START FIRES REQUIRED.

Notice is hereby given that, in accordance with Sec. 497, R. L. H. 1915, IT IS FORBIDDEN to start fires to clear land, including the burning of fallows, stumps, logs, brush, dry grass or fallen timber, for a period of eight (8) months from date on any land, other than cane land, within the City and County of Honolulu unless written permission has first been obtained from the local fire warden or from the Chief Fire Warden, Government Nursery, 1438 S. King St., Honolulu.

The law requires that "such fires shall not be started during a heavy wind or without sufficient help present to control the same, and the fire shall be watched by the person setting the same, or by competent agents of his, until put out."

C. S. JUDD,
Chief Fire Warden.

Honolulu, T. H., May 3, 1920.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XXI—DIVISION OF PLANT INSPECTION.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE CON- TROL OF CERTAIN INSECT AND PLANT PESTS.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule XXI of the Division of Plant Inspection, approved February 25, 1920, concerning the control of certain insect pests and plant pests in the Territory of Hawaii, so as to read as follows:

Section 1. No white ginger root, (*Hedychium coronarium*), no fern plant or part thereof, and no Spanish moss, (*Tillandsia usneoides*), otherwise known as Florida moss or old man's beard, shall be carried, transported, or shipped from any one island in this Territory to any other island in this Territory, except by special written permit from the Board of Agriculture and Forestry.

Section 2. No white ginger root, no fern plant or part thereof, and no Spanish moss shall be transported in any manner from one part or locality of any island to another part or locality of the same island, except by special written permit from the Board of Agriculture and Forestry.

Section 3. Inspectors and other duly authorized agents of the Board of Agriculture and Forestry are hereby empowered to examine and inspect all freight, baggage, and belongings leaving or arriving at any port of the Territory or being transported from one part or locality of any island to another part or locality of the same island and to destroy any and all white ginger roots, any and all fern plants or parts thereof,

and any and all Spanish moss found among or in such freight, baggage and belongings.

Section 4. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars (\$500.00) as provided by Section 529 of the Revised Laws of 1915.

Section 5. This rule as amended shall take effect upon its approval by the Governor.

Approved this 7th day of May, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

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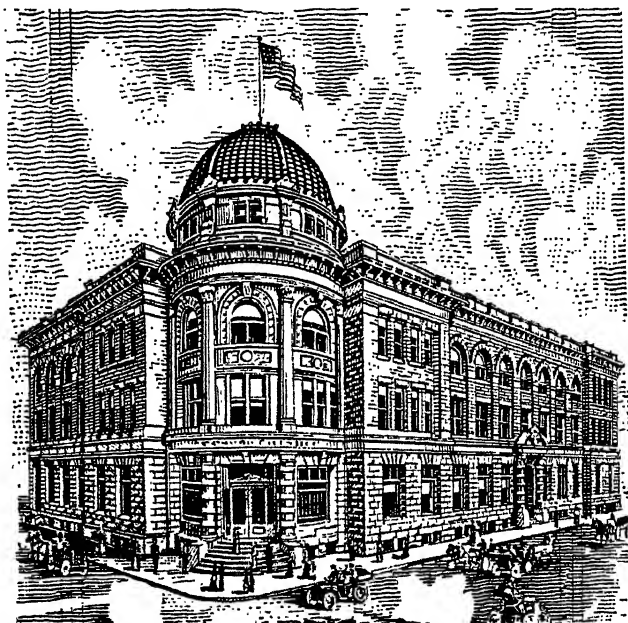
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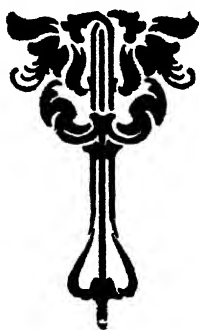
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Forestry, Territory of Hawaii.



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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

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The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papapaholahola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

HILO, HAWAII. Nursery at the Boys' Catholic School in charge of Bro. Matthias Newell, Hilo.

PRICES: Plants in seed boxes \$1.00 per 1000. Transplants in boxes 1c each. Transplants in pots 2½c each.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, JUNE, 1920.

NO. 6

The work of controlling the fern weevil at 29 Miles, Olaa, Hawaii, was about completed during May as pointed out in the current report of the Entomologist.

The dangerous spread of the Hilo grass into our higher mountain areas of indigenous forest caused by the presence of trails through them is pointed out in the current report of the Superintendent of Forestry.

Among the unusual trees planted out by the Division of Forestry during April were Kauri pine, Norfolk Island pine, narra or Indian bloodwood, Arabian teak, bastard sandalwood, or *naio*, and the red pine or *rimu* of New Zealand.

Rule XII of the Division of Plant Inspection was on May 24 amended by the Board and new Rule XXII of the same Division was on the same date adopted by the Board. Further details concerning these rules are contained in this issue.

Section 5 of Rule XX of the Division of Plant Inspection was on the recommendation of President Atkinson amended by vote of the Board on May 24, and the amended section which was approved by the Governor on June 1, 1920, appears on the By Authority pages of this issue.

On May 24, 1920, the Board confirmed the appointment of Mr. L. A. Whitney of San Francisco, as Assistant Plant Quarantine Inspector and Laboratory Assistant in the Division of Plant Inspection. Mr. Whitney was secured by Commissioner Giffard and having been for six years boarding officer and for two years technical assistant in the Office of Plant Quarantine in the Department of Agriculture of the State of California, comes well recommended. He is expected to arrive in Honolulu on June 15 to take up his new duties.

Since the inauguration of the campaign for the eradication of bovine tuberculosis ten years ago, the lowest percentage of reactors to the tuberculin test was reached. During April out of

562 head of dairy cattle tested only 6 animals or 1.06 per cent were found to be affected with the disease.

A public hearing to consider certain changes in several forest reserves has been called by the Governor and the Commissioners and will be held at the office of the Board on King street on Wednesday, June 9, at 2 o'clock p. m. On the same day and place at 2:30 o'clock p. m. a public hearing will be held for the presentation of arguments for or against the adoption of Rule V of the Division of Forestry which proposes to prohibit tramping, in the interest of forest protection, on the upper mountain slopes at the headwaters of Manoa and Palolo Valleys.

Recent Board Appointments

Charles J. Kraebel, *Assistant Superintendent of Forestry*, March 18, 1920. Pay to commence when he reports for duty.

James Henderson, *District Fire Warden* in and for that portion of the District of Hilo, Hawaii, extending from the Puna District line to and including the land of Kikala. March 18, 1920.

L. A. Whitney, *Assistant Plant Quarantine Inspector and Laboratory Assistant* in the Division of Plant Inspection. May 24, 1920. Pay to commence when he reports for duty.

H. P. Agee, *Honorary Plant Inspector*. May 4, 1920.

J. P. Pico, *Forest Ranger* for the Waianae-kai Forest Reserve. Oahu. May 24, 1920.

Rabid Animals in West

That the killing of wild animals afflicted with rabies is an important phase of the work carried on by the Bureau of Biological Survey, United States Department of Agriculture, is indicated by reports received from the bureau's skilled hunters in the West. In western regions where predatory animals are found both human life and live stock are seriously menaced when rabies appears. In Washington, for example, one of the hunters reported that a rabid coyote had attacked two boys sleeping in a haystack and had badly torn the bedquilts covering them before he was driven off. In Oregon a young woman was set upon by a rabid coyote, which finally ran into a store, where it was shot. The following day three school children on horseback in the same

locality were attacked by another coyote, which they succeeded in killing at serious risk to themselves. On a farm near Olympia, Wash., five head of cattle, one hog, and four dogs were killed because they were afflicted with rabies.

A hunter in Bannock County, Idaho, stated that he was endeavoring to locate rabid coyotes in his region, believing them responsible for the loss of many cattle in that vicinity which had gone mad. In five of the Northwestern States there was a very serious outbreak of rabies in 1914 (before Federal control measures were instituted), and as a result more than 1,500 people were bitten and over 50 died. While the disease still exists in scattered localities, the Federal measures undoubtedly are very largely responsible for the prevention of its general spread throughout the western range States.—Weekly News Letter.

Rule XII Revised

The following letter bears on the revision of Rule XII of the Division of Plant Inspection. The revised rule was adopted by the Board on May 24 and approved by the Governor on May 26, 1920:

April 22, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—At the suggestion of Commissioner Giffard, Rule XII of this Board concerning the control of insects and other pests in the Territory of Hawaii has been revised and it is believed improved by the recent experience of Entomologist Fullaway in connection with the control of the Australian fern weevil on Hawaii, and the accompanying draft of this revised rule is respectfully submitted for adoption by the Board, subject to the approval of the Attorney General.

Respectfully submitted,

C. S. JUDD,
Executive Officer.

New Plant Inspection Rule

The following letter bears on the new rule of the Division of Plant Inspection which was adopted by the Board on May 24, and approved by the Governor on May 26, 1920:

April 17, 1920.

Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—For some time past there has been some trouble in regard to potato shipments coming into the Territory. These shipments when infested with scab or eel worms can easily be condemned and returned to the port of debarkation. Despite the fact that a number of shipments have been returned and notice sent to shippers here as well as on the Coast regarding scabby potatoes, yet there seems to be a lack of co-operation on the part of the Coast shipper. I have complained to the Director of Agriculture of California and to the Deputy Horticultural Quarantine Officer and they have both replied that all horticultural produce shipments coming into the San Francisco market do not fall under their jurisdiction, nor have they any control over shipments leaving the Coast for these Islands. They both, however, suggest that the Commissioners take some action regarding the matter and demand inspection certificates at the port of debarkation for horticultural products.

I, therefore, recommend that the Board of Commissioners pass an order that the steamship companies at the various ports on the Pacific Coast be requested to demand an inspection certificate for certain horticultural products that are being shipped to these islands and also that all importers of horticultural products in these islands be notified that such an order has been issued and to take the necessary steps to comply with the order. By such a method we shall be able to keep a better record and will without doubt receive a better grade of produce.

Respectfully yours,

(Sgd.) E. M. EHRHORN,
Chief Plant Inspector.

The Horn-Fly Problem

By D. T. FULLAWAY, *Entomologist*.

There are a number of flies which utilize the dung of cattle and horses to accomplish their development from ova to mature insects and among them several blood-sucking flies, notably the horn-fly, a serious pest of live stock. This fly is most constant in its attention to stock and appears only to leave the cattle to deposit its eggs, which it does on the fresh droppings. In our equable climate, furthermore, it propagates continuously; there is no winter cessation of activity and depletion of numbers, on the

other hand an uninterrupted progression of cycles produces myriads of flies. It is not unusual to find in one dropping over a thousand immature flies. The effect of the perpetual irritation and annoyance of these flies on the cattle is undoubtedly felt in reduced weight or lower milk production. The reduction and control of the dung-flies therefore constitute one of our most pressing entomological problems, but while considerable attention and study has been given to it hardly any improvement of the situation has resulted. The consensus of opinion among local entomologists seems to be that no improvement can be expected until some means is found of disposing of the manure in which the flies develop so as in some measure to render it unsuited to that purpose. Natural agencies would be most applicable here, particularly on account of the peculiar circumstances of insect propagation in these islands, and of range-cattle conditions, where artificial methods of dung disposal would be beyond consideration. The introduction is proposed of onthophagous or dung-feeding beetles (tumble-bugs, etc.), which have never been successfully tried here, and some with greater temerity have favored bird introduction. The ideas advanced and the propositions emanating from them are supported by facts which can daily be confirmed by very casual observation. It is undeniably true that Honolulu is relatively very free of the house-fly. Connect this circumstance with the relative scarcity of horse-manure, in which it develops, and the rapidity with which horse-manure dries out here, also the activity of the common English sparrow in scattering the droppings. The inference is obvious. It is confidently believed that patient search would at length reveal the agents suited to our needs, and that the desired improvement in the fly situation with respect to our live stock industry only waits on governmental activity.

The Kauri Pine

By C. S. JUDD, *Superintendent of Forestry.*

The most promising and widely useful tree for planting in the Hawaiian Islands for the purpose of producing lumber is confidently believed to be the Kauri pine, *Agathis australis*, which although represented here at present only in small numbers, flourishes and grows most satisfactorily. This tree is the monarch of the New Zealand forests and, although it does not rival the giant Sequoias in its extreme height and circumference, it excels them in the intrinsic value of its timber, which possesses a larger number of good qualities than any other pine known to commerce.

The Kauri pine belongs to the cone-bearing family but, unlike the

familiar pines, has foliage which consists of broad leathery green leaves. The trunk has very little taper and it is the columnar-like shape of the bole that gives the Kauri its unprecedented volume of timber. The trunk, which is usually from 80 to 100 feet high and 4 to 12 feet in diameter, has a smooth gray bark which is thick and which on the older trees scales off in large flat flakes. The scales of the cone become woody and closely overlapping form an elegant cone almost spherical and nearly three inches in diameter with a single-winged seed on each scale. The seed of the Kauri does not retain its vitality for a long period and is very difficult to obtain because as soon as the cones mature on the tree, as with the true firs, the scales fall away from the woody axis and the seed is thus scattered in every direction by the wind. If the cones are picked before they are fully ripe it is a difficult matter to obtain mature seed from them.

The genus to which this tree belongs comprises about ten species, distributed through the Malay Archipelago, Fiji, eastern tropical Australia, New Caledonia and New Zealand. The Kauri pine of New Zealand, *Agathis australis*, however, is confined to a limited geographical range in the north half of the North Island, where it is a lowland tree becoming rare at elevations exceeding 1,500 feet, and seldom occupies large areas to the exclusion of other trees. The tree attains its largest dimensions in the mixed forest zone at the higher altitudes and some trees have furnished timbers 60 feet long and 60 inches square. It has been extensively logged in the North Island of New Zealand.

The Kauri pine, contrary to popular thought, is a fast-growing tree, for its average diameter growth is nearly twice that of European forest trees and its height growth more than twice as fast. The average Kauri tree grows one inch in diameter every four and three-quarters years.

All parts of the Kauri pine are exceedingly resinous and this accounts for the remarkable soundness of its timber. The wood is more durable than the best Baltic pine and is regarded as one of the most durable among the timbers of the cone-bearing trees. A Kauri tree can be resin-tapped without interfering with the sap because all the large resin-ducts are in the bark and outside the cambium layer and sap circulation.

The color of the wood varies from yellowish-white to brown in color. The wood, which takes a high polish, is straight-grained, even, compact, firm, clean and silky and, while it is of great strength, it has toughness and elasticity. It is tougher and more elastic than American spruce, and while it is more easily worked than the California redwood, it is without its brittleness.

No other New Zealand timber is capable of being applied to such varied uses. The wood is adapted to all the purposes of the cabinet-maker where a light-colored wood is required. It is excellent for furniture and interior finish, is largely used for posts, rails and shingles, for masts, boats, casks, rims of sieves, and is

particularly sought for decks of ships, lasting for the latter purpose twice as long as the deal of many other pines. It also gives excellent results in bridge building and is good for the light handles of many implements. In short, the wood of the Kauri combines a larger number of good qualities in a high degree of perfection than any other pine timber in general use.

The tree yields besides, the Kauri gum of commerce, which is usually found as a fossil resin from six to seven feet below the surface of the soil on ground formerly covered by Kauri forest and not infrequently in swamps which covered buried forests. The resin is found in irregularly-shaped pieces varying from a few ounces to 100 pounds in weight. Gum digging is a standing source of employment and the Auckland gum fields are said to have proved far more beneficial to the district than its gold fields. Transparent pieces of the fossil gum are used as a substitute for amber in the manufacture of mouthpieces for pipes and small ornaments and the ordinary kinds are chiefly used as a substitute for copal and mastic in the manufacture of varnishes.

The Kauri pine was introduced to Hawaii about 40 years ago and individual trees have been brought in from time to time since then and may be seen growing in many Honolulu yards and at Lihue, Kauai. The only way in which additional Kauri pine seedlings have been available for planting in Hawaii has been to pick up the fresh seed dropped from these scattered trees or to lift from the ground the young seedlings which have sprouted from seed thus dropped. By the former method several thousand Kauri pine seedlings were secured about a year ago from one tree in the Nuuanu Avenue grounds of Mrs. Mary E. Foster in Honolulu and have been planted out in various localities. Over an acre in the Waiahole Forest Reserve, Oahu, has been planted out with these seedlings spaced 10 by 10 feet apart to test their growth for timber under close growing conditions.

Experiments are being conducted at the Government Nursery in raising more of these trees from seed by the introduction of fresh seed from New Zealand, so that more of the seedlings will be available for general planting.

For those in these islands who desire to plant in the moderately moist regions a fairly rapidly growing tree whose timber is classed very high, the Kauri pine is strongly recommended.

Division of Forestry

Honolulu, May 14, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of April, 1920:

TREE PLANTING.

The total plantings during the month in three localities on Oahu amounted to 3,947 trees which were set out as follows: At Makiki 185 koa trees were planted in an open valley on Tantalus to shade out the Hilo grass which has crept in; at Mikilua 2,575 red gum and 772 bloodwood trees were planted out on barren, deforested slopes; and at Waiahole, largely in the nature of an experiment, 70 kauri pines, 200 Norfolk Island pines, 37 narra, 14 Arabian teak, 7 bastard sandalwood (naio), 2 red pine (rimu of New Zealand), and 85 lime trees were set out.

Activities at the several nurseries are reported by the Forest Nurseryman. A start has been made in clearing the newly acquired land next to the animal quarantine station in Hilo, to which it is proposed to move the sub-nursery now at the Catholic Boys' School.

FOREST FENCING.

Arrangements were made during the month with Y. Tanaka to construct a fence over two and one-half miles along the Volcano Road on Hawaii, this Division to furnish the wire and staples and he to supply the posts and erect the fence. This fence will protect a large part of Section C of the Olaa Forest Park Reserve which is an asset to the road leading to the Volcano.

FOREST RESERVE MODIFICATIONS.

A large part of the month was spent in the office compiling reports on needed modifications of forest reserve boundaries which had accumulated. These have already been presented and have received your attention.

KAUAI TRIP.

From April 1—3, I was on Kauai at the direction of the Governor with Mr. H. M. Albright, Field Assistant to the Director of the National Park Service, and conducted him to Waimea Canyon and Kalalau Valley. He was delighted with the scenic aspects of these two places, but left with the opinion that a National Park is not at present necessary there, in view of the arrangements, made by the Board and the County of Kauai, giving people the opportunity to visit the canyon.

FIELD TRIP.

One day was spent in marking algaroba trees for thinning at Lualualei under a Land Office license and another in an inspection of the Olympus-Konahuanui trail. On the latter, no new land slides were observed, but the Hilo grass is becoming more abundant even to the extent of a patch 10 feet square on the top of Mt. Olympus. This, in my opinion, makes the adoption of proposed Rule V of this Division more urgent.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, May 10, 1920.

Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit the following report of the work done during the month of April, 1920:

NURSERY.

Distribution of Plants—

	Pot- Grown.	Transplant Boxes.	Total.
Sold	97	100	197
Gratis	745	605	1,350
Total	<u>842</u>	<u>705</u>	<u>1,547</u>

COLLECTIONS.

Government Realizations—

Collections on account of plants sold	\$ 2.80
Rent of office, Nursery grounds	35.00
Total	<u>\$37.80</u>

Preservation of Forest Reserves—

Fee for camp site No. 30, Jan. 1 to Dec. 31, 1920, Kokee Camp, Na Pali Kona Forest Reserve, Kauai	\$ 9.00
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Animal Industry Revolving Fund—

Hemorrhagic septicemia vaccine (Harold Rice, Paia, Maui)	\$17.10
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PLANTATION COMPANIES AND OTHER CORPORATIONS.

A total of 1,000 trees in transplant boxes were distributed to plantation companies and other corporations during the past month.

MAKIKI STATION.

The work at this station has been principally routine. We are increasing our stock and preparing for the coming planting season.

HONOLULU WATERSHED PLANTING.

A total of 185 koa trees were planted during the month on land adjoining the Schmidt estate at the back of Sugar Loaf Hill.

ADVICE AND ASSISTANCE.

The writer has been called upon during the month to make the following number of calls and otherwise give advice and assistance as follows:

Calls made	6
Advice given by telephone	7
Advice given to people calling	9

REPORTS FROM SUB-NURSERIES.

Hawaii Nursery, Hilo.

Brother Newell reports that he distributed 307 trees in transplant boxes during the month.

Maui Nursery, Haiku.

Mr. James Lindsay reports that he has distributed 150 trees during the month.

KAUAI NURSERY, KALAHEO.

Mr. Joe Rita, Jr., reports that he has on file orders for 3,000 trees which he is propagating and will deliver them when ready.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, May 10, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of April, the insectary handled 12,800 pupae of the melon fly from which were bred 2,387 females and 2,484 males (*Opus fletcheri*).

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opus fletcheri.

	Females.	Males.
Oahu:		
Kalakaua Avenue	300	350
Moiliili	250	250
Waialua	150	150
Kaimuki	400	400
Pearl Harbor	300	300

FRUIT FLY PARASITES.

Diachasma fullawayi.

Oahu:		
Nuuanu Avenue	125	125
Kaimuki	20	20

Opus humilis.

Oahu:		
Nuuanu Avenue	50	50
Kaimuki	100	100

Dirhinus giffardi.

Oahu:		
Nuuanu	200	
Kaimuki	150	

Diachasma tryoni.

Oahu:		
Nuuanu	250	250
Kaimuki	100	100

Tetrastichus giffardianus.

Oahu:		
Nuuanu	1400	
Kaimuki	1200	

Galesus silvestri.

Oahu:		
Nuuanu	300	
Kaimuki	100	

DUNG FLY PARASITE.

Spalangia cameroni.

Hawaii:		
Keaau	500	

The Entomologist returned to the Island of Hawaii on the 22nd of the month to inspect the fern weevil eradication work at 29 Miles, Oloa. A careful examination of the ferns on the boundary of the infested area was made in company with Mr. Swezey, Chief Entomologist of the H. S. P. A., and on finding stragglers occupying two sections of the borders (Tom Cook and Carlsmith lots), the fern growth at these points was cleared to a depth of thirty-five to fifty feet, burned, and the ground scarified and sprayed with arsenite of soda. This work occupied two weeks. While it was progressing the entomologist personally applied the sodium arsenite spray to all ferns that could be found in the koa park, Deyo and Bowman lots and on the lava tube section of the Shipman property. The Kennedy and Shipman pastures were also gone over and the ferns on them hand-picked as far as possible. The weevils could not be found anywhere on the borders of the infested area, except as above noted, and on the interior area surprisingly few ferns could be found in the koa park or Kennedy pasture and no weevil was detected in the latter. There were still some ferns and weevils in the Shipman pasture and Mr. English has been notified to hand pick these ferns more thoroughly. Weevils were found in the lava tubes, but no indication of spreading was observed. They were also found in the back of the Deyo and Bowman lots, but the spraying and burning which will be done there will probably check them completely. Mr. English had practically completed the burning of the fern stumps piled on his property when the entomologist returned to Honolulu on May 10th, and has been requested to do as much spraving as possible on his lot to destroy the stragglers. Orders were also left with a Japanese workman in the neighborhood to continue spraying if it was found necessary in order to destroy all neglected or sprouting ferns throughout the month of May. This work is to be done under the supervision of Mr. Mackenzie.

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, April 30, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of April, 1920, as follows:

During the month 77 vessels arrived at the Port of Honolulu, 19 of which carried vegetable matter and 16 vessels came through the Panama Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	877 lots	18,336 pkgs.
Fumigated.....	57 "	57 "
Burned.....	73 "	73 "
Returned.....	1 "	100 "
Total Inspected.....	1,008 lots	18,566 pkgs.

Of these shipments 17,780 packages arrived as freight, 217 packages as mail and 566 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 26,146 bags of rice from Japan, 600 mats of rice from China and 2,757 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 6,514 pieces of baggage belonging to immigrants from foreign countries were examined, from which 26 lots of fruit and 32 lots of vegetables were seized and destroyed.

On April 1, per Tenyo Maru, a package of seeds found in the mail from Japan was fumigated precautionarily. A package of chestnuts from Japan, also in the mail, was fumigated on account of weevils.

On April 5, per Korea Maru, a package of seeds from Cuba for Dr. Lyon, and a package of seeds from Chile for the Board of Agriculture, both in the mail, were fumigated precautionarily.

On April 8, per Anyo Maru, 5 packages of plants in the possession of immigrants from Japan were seized and burned, being prohibited. Also a package of rice puddy in the mail from Japan was burned. Two packages of tree seeds in the mail for the U. S. Experiment Station from Java were fumigated on account of decay mites.

On April 11, per Siberia Maru, a package of plants and a package of bamboo shoots found in the baggage of an immigrant from Japan was seized and destroyed by burning.

On April 13, per Nanking from China, a package of herbs found in the mail infested with moth larvae was seized and burned. Under even date, per Wilhelmina, a plant in the baggage of a passenger from California was fumigated with HCN, being infested with aphid. Forty orchids, also in the possession of a passenger, were fumigated on account of mealy bug. One hundred sacks of potatoes consigned to the California Feed Company from California were returned, being badly infested with potato scab.

On April 14, per Ecuador, a package of seeds in the mail for the U. S. Experiment Station from Java was fumigated precautionarily. Three-

packages of seeds in the baggage of immigrants from Manila were seized and destroyed.

On April 21, per Shinyo Maru, a package of sugar cane and a plant found in the baggage of immigrants from China were seized and destroyed by burning. A package of bamboo shoots in the baggage of an immigrant from Japan was also burned, as all bamboo in the raw and manufactured state is prohibited. In the mail, a package of beans from Japan, 3 packages of vegetable seeds from Manila and 2 packages of pili nuts from Manila were all fumigated precautionarily. Two packages of tree seeds from Manila in the mail were seized and destroyed as contraband.

On April 23, per Tenyo Maru, a package of algaroba beans in the mail from the U. S. Dept. of Agriculture for the U. S. Experiment Station was fumigated precautionarily.

On April 27, per Matsonia, two lots of pineapple suckers arrived in the mail for Dr. Lyon, H. S. P. A. One lot from Guatemala, through the Bureau of Plant Introduction, was found infested with the pineapple mite. These were fumigated with double strength HCN and the plants are now held in quarantine. The other lot was from Mexico through the Bureau of Plant Industry. Two of the suckers were found infested with the pineapple weevil and these were immediately burned. The rest were fumigated, being found infested with mealy bug, and are now held in quarantine.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of 7 steamers at the Port of Hilo. Six carried vegetable matter consisting of 127 lots and 2,186 parcels, all clean with the exception of 3 sacks of turnips which, having arrived in an unclean condition, were washed before delivery. Twenty-five hundred bags rice and 187 bags beans arrived from Japan in 15 and 7 lots respectively, all clean.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of 8 vessels at the Port of Kahului. Two carried vegetable matter consisting of 9 lots and 478 parcels, all passed.

INTER-ISLAND INSPECTION.

Fifty-eight steamers plying between Honolulu and the other island ports were attended and the following shipments passed as free from pests:

Taro.....	444 bags
Taro tops	20 "
Vegetables.....	305 pkgs.
Fruit.....	149 "
Plants.....	59 "
Seeds.....	19 "
Pineapple shoots.....	2,937 bags
Sugar cane (H. S. P. A.).....	16 cases

Total passed..... 3,848 pkgs.

Thirty-nine packages of plants were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, May 12, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I beg to submit the following report of the work of this Division for the month of April:

TUBERCULOSIS CONTROL.

The total number of cattle tested during the past month was 562. Of this number 6, or 1.06% were condemned and slaughtered, post mortem examinations proving the presence of tuberculosis.

The subject of the testing of Mr. Perry's cattle has been brought up but no satisfactory results have been reached as yet. After the last Board meeting, May 4, Mr. Perry was notified by phone to have his cattle ready for testing on May 10. He replied that he wanted to discuss the matter further with the President of the Board and would let me know what had been decided. Since then nothing has been heard from him.

Some decision should be reached in this matter. We have now reached the lowest percentage of tuberculosis since organized control work on this disease was inaugurated just ten years ago this month. We have come to the point where we can concentrate our efforts upon the few places where tuberculosis exists to any extent. Many of the dairies here are clean and have been so for some time, consequently it is not necessary to test them so frequently. They are being inspected regularly and the addition of new cows noted, which cows are tested immediately.

We have laws preventing the introduction of tuberculosis from the mainland; we have laws preventing its introduction to the Island of Oahu from other islands of the group; we have the lowest percentage of tuberculosis so far recorded. It but needs now the hearty co-operation of every stock owner of Oahu to make the complete eradication of this disease a fact.

CONTAGIOUS ABORTION OF CATTLE.

The treatment of cattle affected with this disease is still being continued. One more Honolulu dairy has been added to the list of those known to be definitely infected. With the amount of bacterins and serum on hand we may reasonably expect to keep the losses from this disease at a minimum. It may be necessary later to promulgate rules regulating the transfer of animals from infected dairies to dairies known to be clean.

HEMORRHAGIC SEPTICEMIA OF SWINE.

Several outbreaks of this disease among swine have occurred recently. In one rather extensive outbreak nearly a hundred animals of all ages were lost before any report was made to this office. Since vaccination, however, the losses have been confined to the death of four three weeks' old pigs. In the other outbreaks the losses have been reduced correspondingly.

IMPORTATION OF LIVE STOCK.

Of the different classes of live stock imported during the past month special attention may be called to the Angus and Holstein cattle brought down for the Grove Farm, Maui. They were all high class animals of a kind of which this Territory is very much in need.

Respectfully submitted,

L. N. CASE,
Asst. Territorial Veterinarian.

Honolulu, May 6, 1920.

REPORT OF ASISTANT VETERINARIAN.

Dr. V. A. Norgaard, Chief, Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu.

Dear Sir:—I beg to submit the following report for the month of April:

TUBERCULOSIS CONTROL.

The following cattle were tested:

	Tested.	Passed.	Con- demned.
Alexander & Baldwin	32	32	0
Geo. P. Cooke	1	0	1
Chas. Lucas	1	1	0
O. B. & L. Co.	511	507	4
M. Freitas	6	6	0
John Waterhouse	4	3	1
C. Brewer & Co.	2	2	0
Pedro Dias	2	2	0
M. A. Salado	1	1	0
M. Robinson	2	2	0

From the above list it will be seen that a total of 562 head of cattle were tested, out of which number 556 were passed, and 6 condemned and branded.

Post-mortem examinations were held at the local abattoirs on previously condemned animals, positive lesions of tuberculosis being present in every case.

CONTAGIOUS ABORTIONS AMONG CATTLE.

Positive evidence of contagious abortion among the cattle of several dairies has been obtained and at the present time 17 head of fine dairy cows are being treated with contagious abortion bacterins, of which we have a sufficient amount on hand.

CONTAGIOUS EPITHELIOMA.

Fifty-four chickens were injected with vaccine for this disease and 100 cc. of vaccine distributed to different chicken raisers. So far we have had comparatively few outbreaks of this disease reported this year.

HEMORRHAGIC SEPTICEMIA OF SWINE.

A small outbreak of this disease appeared in a herd of pure-bred Berkshires. Post-mortem examination established the nature of the disease and vaccine was administered at once with the result that the loss was confined to a few three or four weeks' old pigs.

IMPORTATION OF LIVE STOCK.

Eighty-six vessels entering this port were boarded and inspected for live stock. Out of this number the following were found to carry live stock for this Territory:

- S. S. Tenyo Maru, Orient: 1 chow dog, F. E. Richardson.
- S. S. Eastern Gale, Seattle: 5 Angus bulls, 4 Angus heifers, 20 Holstein cows, Grove Farm, Maui.
- S. S. Nile, Orient: 1 chow dog, Lieut. Moore.
- S. S. Waukegan, London, England: 1 Boston bull terrier, A. E. Downing.
- S. S. Manoa, San Francisco: 32 crates poultry.
- S. S. Siberia Maru, Sydney: 2 dogs, George C. Munroe.
- S. S. Lurline, San Francisco: 2 Hereford bulls, C. Brewer & Co.; 23 mules, Hawaiian Pineapple Co.; 25 crates poultry: 23 mules, 18 horses, F. H. Locey, Maui.
- S. S. Matsonia, San Francisco: 1 Boston bull terrier, M. M. Jones.

Respectfully submitted,

L. N. CASE,
Asst. Territorial Veterinarian.

By Authority

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XII.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE CONTROL OF INSECTS AND PLANT DISEASES IN THE TERRITORY OF HAWAII.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule XII of the Board approved December 30, 1911, concerning the control or eradication of injurious insects or other injurious animals or dangerous plant diseases, or insects, or other animals or plant diseases likely to become injurious to trees, plants, or other vegetation of value and the fruit thereof in the Territory of Hawaii, so as to read as follows:

Section 1. All officers, inspectors or other duly appointed agents of the Board of Agriculture and Forestry are hereby authorized and empowered to enter public or private premises, excepting private houses

at all reasonable times to search for injurious insects or other injurious animals or dangerous plant diseases, and to carry out the orders of the Board in relation thereto and they shall not be holden guilty of any misdemeanor by so doing nor shall they be personally liable in damages except for acts beyond the scope of their authority or due to their own negligence.

Section 2. Whenever any injurious insect or other injurious animal or dangerous plant disease is discovered on any premises, the officer, inspector or other duly appointed agent of the Board charged with that duty, shall notify the owner of the same and prescribe a method or methods of controlling or eradicating the said insect or other animal or plant disease, and the owner, upon receipt of such notification shall do and perform the prescription of said officer, inspector or other duly authorized agent, relative to its control or eradication, or upon failure to so do and perform within a reasonable time after notification, the said officer, inspector or duly authorized agent may and is hereby authorized and empowered to enter upon said premises to do and perform the same or cause the same to be done and performed.

Section 3. All officers, inspectors and other duly authorized agents of the Board are hereby authorized and empowered to seize and destroy any soil, nursery stock, tree, sugar cane, shrub, plant, flower, vine, cutting, graft, scion, bud, seed, root, fruit pit, fruit, vegetable, leaf, nut or other vegetable growth, or other substances and any box, barrel, package or packing material or containers in which said articles or any of them have been transported or contained, which is or may be infected or infested with or likely to assist in the transmission or dissemination of any injurious insect or insects or injurious animal or animals or dangerous plant diseases, or diseases found in any shipment in any part of the Territory.

Section 4. Any person, firm or corporation violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars (\$500), as provided by Section 529 of the Revised Laws of Hawaii of 1915.

Section 5. This rule, as amended, shall take effect upon its approval by the Governor.

Approved this 26th day of May, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

AMENDMENT TO RULE XX—DIVISION OF PLANT INSPECTION.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Section 5 of Rule XX of the Division of Plant Inspection, approved May 26, 1919, concerning the control of insect pests and plant diseases in the Territory of Hawaii, so as to read as follows:

Section 5. Plants and trees for forestry, horticultural and agricultural purposes may be shipped in reasonable quantities from the Island of Oahu to any other island in the Territory under a special permit, when said plants and trees have been grown in sterilized soil under conditions and for a period satisfactory to the Chief Plant Inspector, or have been transplanted to sterilized soil prior to shipment and properly housed to

prevent fresh contamination, provided that all the operations in question have been carried out at the expense of the shipper under the direction of, and subject to the approval of the Chief Plant Inspector, and provided that said plants and soils are apparently free from infestation or infection which bears potential danger to the agriculture or plant life of the other islands.

This amendment shall take effect upon its approval by the Governor.

Approved this 1st day of June, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

TERRITORY OF HAWAII.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

RULE XXII—DIVISION OF PLANT INSPECTION.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY OF THE TERRITORY OF HAWAII CONCERNING THE IMPORTATION INTO THE TERRI- TORY OF HAWAII OF POTATOES AND APPLES FROM PACIFIC COAST PORTS.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby makes the following rules and regulations for the purpose of preventing the introduction into this Territory from Pacific Coast ports of the United States of insect pests and plant diseases which may be carried on potatoes and apples:

Section 1. No shipment of potatoes or apples in the natural or raw state, whether by freight or express, shall be permitted to be imported into the Territory of Hawaii from ports on the Pacific Coast of the United States of America unless such shipment is accompanied by a certificate signed by a qualified officer of the city, county, or state from which the shipment is made, that the shipment has been inspected by him and is shipped free from insect pests and plant diseases.

Section 2. The certificate of inspection required by Section 1, must give the name of the shipper, the name of the consignee and the number of sacks, crates or boxes contained in each shipment if potatoes or apples, and one copy must be attached to a sack, crate or box in each shipment and another copy delivered to the Chief Plant Inspector or his assistant by the person, firm or corporation transporting such potatoes or apples, upon the arrival of the shipment in the Territory.

Section 3. No person, firm or corporation engaged in the transportation of freight or express packages between the said Pacific Coast ports and the ports of Hawaii, shall land or cause or allow to be landed in any port or on any wharf in the Territory of Hawaii, any such shipment of potatoes or apples in the natural or raw state without first delivering the certificate of inspection, provided for in Section 2, hereof, to the said Chief Plant Inspector or his assistant.

Section 4. Any shipment of potatoes or apples arriving in the Territory unaccompanied by said certificate of inspection will be returned to the consignor at his own expense.

Section 5. Any person, firm or corporation violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be

punished by a fine not to exceed Five Hundred Dollars (\$500.00) as provided by Section 529 of the Revised Laws of Hawaii of 1915.

Section 6. This rule shall take effect on July 1, 1920.

Approved this 26th day of May, 1920.

C. J. McCARTHY,
Governor of Hawaii.

FOREST RESERVE HEARING.

Notice is hereby given that under the provisions of Chapter 37, R. L. H., 1915, a public hearing will be held by the Governor of Hawaii and the Board of Commissioners of Agriculture and Forestry on Wednesday, the 9th day of June, 1920, at 2 o'clock p. m., in the office of said Board at the Government Nursery, King Street, Honolulu, to consider the defining of the limits and the setting apart as a forest reserve of certain government land, the modification of boundaries, and the withdrawal of land from forest reserves, more particularly as follows:

1. Island of Hawaii, District of Puna, Land of Olaa, 30,000 square feet addition to Section C Olaa Forest Park Reserve.

2. Island of Hawaii, District of Puna, Land of Olaa, withdrawal of 81.7 acres from the Olaa Forest Reserve.

3. Island of Oahu, District of Honolulu, withdrawal of 3,230 square feet from Honolulu Watershed Forest Reserve on Tantalus Heights.

4. Island of Kauai, District of Puna, modification of lower boundary of Lihue-Koloa Forest Reserve, net reduction about 658 acres.

5. Island of Hawaii, District of Kawaihau, modification of boundaries of Kealia Forest Reserve, net reduction about 885 acres.

Maps and description of the said lands are on file in the office of the Superintendent of Forestry where they are open to the inspection of the public. At the said time and place all persons who so desire will be given full opportunity to be heard upon the subject matter of this notice and to present evidence and arguments in person, by proxy, or by letter, either for or against the setting apart of said lands as forest reserves or the elimination of said lands from existing reserves.

C. J. McCARTHY,
Governor of Hawaii.

The Capitol, Honolulu, T. H.,
May 24, 1920.

NOTICE OF PUBLIC HEARING.

Notice is hereby given that a public hearing will be held by the Board of Commissioners of Agriculture and Forestry at the office of said Board at the Government Nursery, King Street, Honolulu, at 2:30 o'clock p. m., on Wednesday, June 9, 1920, to consider arguments for or against the adoption by the Board of Rule V of the Division of Forestry which proposes, in the interest of forest protection, to prohibit tramping on the upper mountain slopes of the Palolo and Manoa watersheds in the District of Honolulu, Island of Oahu.

C. S. JUDD,
Executive Officer.

Honolulu, June 3, 1920.

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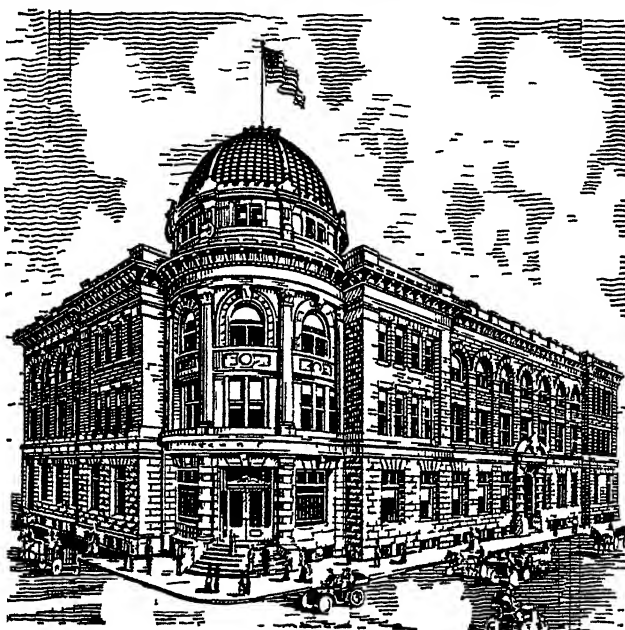
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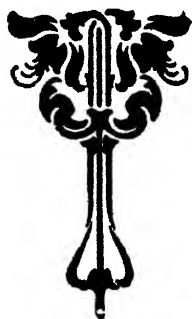
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A Monthly Magazine of Forestry,
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and Agriculture

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Board of Agriculture and Forestry

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The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papapaholahola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

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C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, JULY, 1920.

No. 7

The present issue of the Forester is devoted largely to information concerning forest reserve changes.

Mr. Charles J. Kraebel, Assistant Superintendent of Forestry, arrived from Portland, Oregon, on June 22, and at once undertook his new duties in the Division of Forestry.

The epidemic of hemorrhagic septicemia in Kau was brought to an early conclusion by the vaccination of 6306 head of cattle. The total deaths from the disease were confined to 120 head.

The fire menace still exists in certain localities of the Territory on account of the dry spell, and all those who go into or near the forest are cautioned to use the greatest of care and not to start any fires.

Mr L. A. Whitney, the new Assistant Plant Quarantine Inspector and Laboratory Assistant in the Division of Plant Inspection, arrived from San Francisco on June 15, and immediately assumed his new duties.

A considerable amount of Congressional vegetable seed is still available for distribution at the Government Nursery, King Street, and will be mailed out free of charge to those who apply to Mr. David Haughs, Box 207, Honolulu.

A public hearing was held on June 9 at the Government Nursery, Honolulu, to consider the closing of the Olympus-Kona-huanui trail in the interest of forest protection on the Honolulu Watershed and arguments were presented for and against the adoption of Rule 5 of the Division of Forestry. The matter is still under consideration.

Forest Reserve Changes

On June 9, 1920, there was held a public hearing at the Government Nursery to consider certain changes in five forest reserves, which had received the approval of the Commissioners on May 4 and 24. No one appeared to object to these changes and on June 21 the Governor signed the proclamations which appear in this issue.

These changes were as follows:

1. Addition of 30,000 sq. ft. of land along the Volcano Road acquired by exchange from Fred G. Snow, to Sec. C. of the Olaa Forest Park Reserve, Hawaii.

2. Withdrawal of 83.10 acres of agricultural land from the Olaa Forest Reserve, Hawaii, near 24 Miles so that it may be leased.

3. Withdrawal of 3230 sq. ft. of land on Tantalus Heights within the Honolulu Watershed Forest Reserve, Oahu, desired by the Land Commissioner for exchange purposes.

4. Change in lower boundary of Lihue-Koloa Forest Reserve, Kauai, to release agricultural land and conform to established fence line across lands of Hanamaulu and Wailua. The net reduction in area amounts to 658 acres.

5. Modification of boundary of Kealia Forest Reserve, Kauai, to release agricultural land and make certain lines more definite. The net reduction in area amounts to 885 acres.

Copies of reports of the Superintendent of Forestry on these projects are printed in this issue.

With these changes the present total area in the 47 forest reserves now amounts to 817,114 acres. Of this 557,344 acres or 68% is land belonging to the Territory.

Forest Reserve Addition

OLAA FOREST PARK RESERVE.

Honolulu, April 26, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—In exchange for 30,000 square feet of land in Sec. C. of the Olaa Forest Park Reserve, District of Puna, Island of Hawaii, which was withdrawn from this reserve by proclamation of the Governor signed December 31, 1918, Mr. F. G. Snow has deeded to the Territory an equal area in the immediate vicinity on the Volcano Road near 22 Miles which is covered with a heavier growth of tree ferns and ohia forest.

The area is already fenced and protected from stock and since it lies between two adjacent pieces of forest reserve land it should properly be added to this reserve system.

For this reason I recommend that the 30,000 square feet of land near 22 Miles, Olaa, Puna, Hawaii, deeded to the Territory by Mr. F. G. Snow be added to and made a part of Sec. C. of the Olaa Forest Park Reserve and that the Governor be requested to take the necessary steps to accomplish this.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

Forest Reserve Withdrawals

OLAA FOREST RESERVE.

Honolulu, April 26, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—Subsequent to the setting apart of the Olaa Forest Reserve in the District of Puna, Island of Hawaii, on December 31, 1918, I had occasion to run out some lines with a government surveyor near 24 Miles on the Volcano Road, and it was discovered that a portion of the reserve, amounting to 81.7 acres, consisted of agricultural land on which potatoes and corn were being raised.

All of the 20,030 acres of the Olaa Forest Reserve has been laid out in the past into lots with the idea that it would be homesteaded but, after repeated failures, bona fide homesteaders have given up the attempt to cultivate the land, and it was to prevent further forest destruction by grazing in this vast forest under lease that it was set apart as a reserve.

The small area in question, shown on the accompanying blue-print map, is probably the only piece of land in the reserve which is more valuable for agriculture than for forest purposes at the present time, and its inclusion in the reserve was not known until this later survey was made.

Since the 81.7 acres is strictly agricultural land and is now under cultivation, it seems best to withdraw it from the reserve so that it may be leased by the Land Office in the usual lawful manner. If this is done, the applicant for the lease has agreed to fence the entire boundaries of this land.

For this reason I recommend that the Board approve the with-

drawal of the 81.17 acres from the Olaa Forest Reserve, and that the Governor be requested to take the necessary steps toward this end.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

HONOLULU WATERSHED RESERVE.

Honolulu, April 28, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—As per the accompanying letter of March 13, 1920, the Commissioner of Public Lands has requested that a small parcel of land consisting of 3230 square feet adjacent to Lot 14 on Tantalus within the Honolulu Watershed Forest Reserve, District of Honolulu, City and County of Honolulu, and shown on the accompanying sketch map be withdrawn from the said reserve and returned to his jurisdiction so that it may be exchanged for a parcel of land for "Fern Park" in Kapalama, Honolulu.

Upon investigation, I find that the only suitable building site for Lot 14, from which any view could be obtained, is the area in question and that buildings were constructed on the area long before it and the surrounding lands were included in the forest reserve. The small area has no native forest upon it and I see no particular objection to legalizing the occupancy of the land by returning it to the jurisdiction of the Commissioner of Public Lands.

There is a road leading down to the area from mauka, and in order to continue a trail right of way the Parke Estate has agreed, if this withdrawal is made, to construct a trail under my supervision along and below the northwest side of this land to connect up with the government land on the ridge makai of the piece. In this way travel up the ridge will not be interrupted. For the above reason I recommend that the Board approve the withdrawal of the 3230 acres from the Honolulu Watershed Forest Reserve and that the Governor be requested to take the necessary further action.

Respectfully submitted.

C. S. JUDD,
Superintendent of Forestry.

(COPY)

Honolulu, T. H., March 13, 1920.

C. S. Judd, Esq.,
Superintendent of Forestry,
Honolulu, T. H.

Dear Sir:—Enclosed herewith, permit me to hand you description of survey and blue print showing 3230 square feet of land on Tantalus, Honolulu, Oahu, within the Forest Reserve, which is now and for some time past has been occupied by the Annie S. Parke Estate.

It is desired, if possible, to have this area withdrawn from the Forest Reserve, in order that the same may be exchanged for a parcel of land required for "Fern Park," Kapalama, Honolulu, Oahu.

It seems that several years ago when the buildings were erected on this Tantalus property, the then owner of the Parke lot encroached upon the Forest Reserve, with the result that the building, outhouse and tanks were erected on Government property.

I would, therefore, respectfully request that you take this matter up with the Board of Agriculture and Forestry, with the idea of having this area withdrawn from the Reserve.

Very truly yours,

(Signed)

C. T. BAILEY,
Commissioner of Public Lands.

Change of Boundary

AMENDMENT TO LOWER BOUNDARY OF LIHUE-KOLOA FOREST RESERVE, KAUAI.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—Soon after taking office in 1915, my predecessor wrote me and pointed out the advisability of making a change in the official boundary line of the Lihue-Koloa Forest Reserve, District of Puna, Island of Kauai, so as to conform with the new fence built across the land of Wailua in 1914. This new fence was constructed somewhat mauka of the original forest reserve boundary, proclaimed on June 5, 1909, which runs straight across the land of Wailua from near Hanahanapuni Hill to North Olo-hena, for the reason that it could be more conveniently built on this new line and also because the section between the actual

reserve boundary and the new fence was more suitable for other than forest purposes, it consisting of a number of open flat topped ridges without tree growth, which will be needed either for homesteading or grazing.

As time has allowed it, I have examined the areas and had the government surveyor run out the proposed new line not only across this portion of the government land of Wailua, but across the remainder and across the private land of Hanamaulu, which conforms with the forest fence built across these lands some years ago by the Lihue Plantation. This is shown on the accompanying map.

The present forest fence, which is in stock-proof condition and is maintained by the Lihue Plantation, is the logical location for the official forest reserve line across these lands.

The proposed amendment to the description of the lower boundary line substitutes eight new courses for courses Nos. 28-34 contained in the original proclamation of June 5, 1909, and lessens the area of Hanamaulu in the forest reserve by 218.80 acres, and the area of Wailua in the forest reserve by 433.85, or a total reduction of 652.65 acres.

Since the land affected by the amended description consists of open, treeless areas, which are more valuable for other than forest purposes, and the amended description conforms to a permanently established fence, I recommend that the lower boundary of the Lihue-Koloa Forest Reserve be modified as shown above by substituting the eight new courses for courses 28 to 34 of the original description and that the Governor be requested to make this change in the usual manner.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

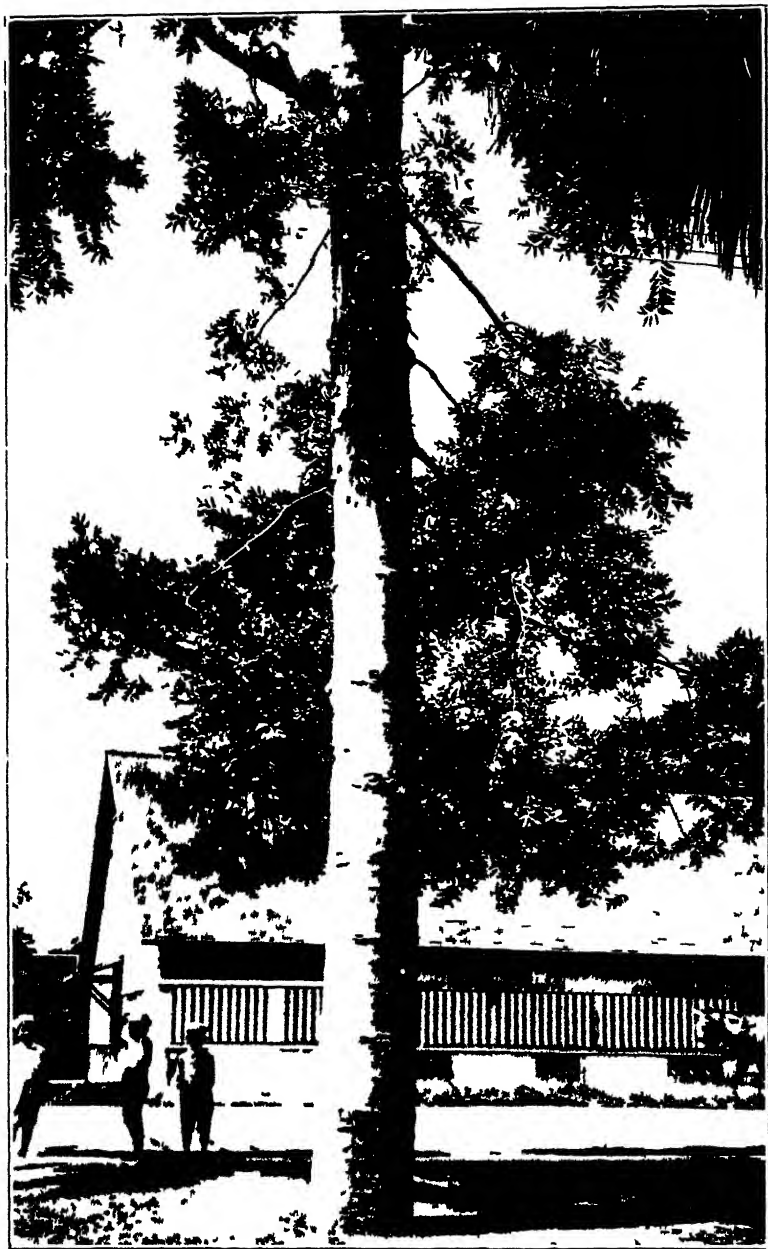
Modification of Boundary

KEALIA FOREST RESERVE, KAUAI.

April 26, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I respectfully recommend a modification of the boundaries of the Kealia Forest Reserve, District of Kawaihau, Island of Kauai, which will result in eliminating some flat land, not now covered by forest, which is more valuable for the intensive cultivation of cane and pineapples, and which is in demand



Kauri pine at Government Nursery, Honolulu Age 35 years Height
66 feet Diameter 25 inches

Accompanying insert was inadvertently omitted from June issue. To be pasted in between pages 168 and 169.

for this purpose. The proposed modification will throw out of the reserve 358 acres in Anahola and 403 acres in Kamalomaloo, both of which are government lands, or a total area of 761 acres.

As will be seen by the attached report of the former Superintendent of Forestry of August 23, 1913, the project has previously been before the Board. The case never came to a hearing because Governor Pinkham was opposed to the elimination.

The present Governor, Land Commissioner and residents of Kauai have requested that this open land, now covered only by mostly Hilo grass, be eliminated so that it may be put up for a general lease, and be utilized for some more useful purpose. A clause will be inserted in this lease requiring the construction of a stock-proof fence on the new boundary.

In my opinion this open land is not essential to the remainder of the reserve because the forest begins further back at the new recommended line, and it is there that the permanent line should be established.

I approve my predecessor's recommendation that the revised and accurate description of the boundaries of the Kealia Forest Reserve as contained in C. S. F. 2475 be used when this modification is made.

The revised boundaries, shown on the accompanying map, include the following lands:

Kapaa (Government)	2290 acres
Kealia (Makee Sugar Co.)	2470 acres
Kamalomaloo (Government)	630 acres
Anahola (Government)	3660 acres

Total area9050 acres

As will be seen from the above, 93% of the revised area belongs to the Government and the modified area, based on more accurate surveys than the original, is 885 acres less than the area originally proclaimed.

Since the land is not needed for strictly forest purposes, and is more valuable for agriculture, I recommend that the Board approve the proposed change of boundary and that the Governor be requested to make the required modification in the usual manner.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

(Copy)

Honolulu, August 23, 1913

KEALIA FOREST RESERVE, KAUAI.

Board of Commissioners of Agriculture and Forestry, Honolulu,
Hawaii.

Gentlemen:—The purpose of this report is to recommend the elimination from the Kealia Forest Reserve, District of Kawaihau, Island of Kauai, of a portion of the government lands of Kamalomaloo and Anahola, lying on the upland between the Kaneha Reservoir and the present forest reserve boundary line across those lands. The new line passes just mauka of a proposed reservoir on Anahola in a lateral gulch on a plateau above the Anahola stream. By pushing the boundary mauka from its present location, the size of the reserve is reduced from 9935 to 9050 acres. The area to be taken out of the reserve is now open grass land with only a few scattering individual trees. It is crossed by three or four small gulches that are in part lined with shrubs, ferns and other low growing vegetation. But the relocation of the line brings the reserve boundary to what may properly now be considered as the permanent forest line.

When the Kealia Forest Reserve was created, in March, 1906, this area was included in the reserve because it was then expected that there would be put into operation a somewhat elaborate tree-planting proposition, suggested by Mr. George Fairchild, then manager of the Makee Sugar Company, which was to be carried out by his company. The argument was that this land was not suitable for agriculture, the soil being too heavy and cold, and further that it would be of more benefit to have it planted in trees rather than used for grazing. But the tree planting never was consummated, and now conditions on Kauai have so changed that all available grazing land is urgently needed. As the essential purpose in all government land work is to put each tract to the use for which it is best adapted, it seems wise to eliminate this particular section from the forest reserve and let it be used in other ways. If the suggested modification is approved by this Board, it is proposed by the Land Office, after the Governor has issued the proclamation changing the boundary, to lease the area taken out of the reserve, with the requirement that a fence be built and maintained on the new line. There is a clause in the present leases of the Anahola and Kamalomaloo lands that requires the construction of a fence on the present forest reserve boundary. Owing to the fact that this proposed change was pending, that fence has not been built. The fencing of the proposed line will effectively prevent stock from getting into the dense forest mauka.

In preparing the revised description of the reserve boundary, the Territorial Survey Office has also made some corrections on other courses than those across Anahola and Kamalomaloo. These are based on more accurate data, the result of recent surveys, than were in hand when the description was originally compiled. The corrected description of the entire Kealia Forest Reserve accompanies this report. It is numbered C. S. F. 2475, and recorded on Government Registered Maps Nos. 2282, 2449 and 2452.

Believing for the reasons stated above that the proposed elimination is for the general benefit of the Territory and that, since the tree planting project has fallen through it will increase rather than diminish the value of the reserve as a whole to take this area out, I do now recommend that the Board approve the proposed change of boundary and that the Governor be requested, as provided by law, to make the required modification.

Very respectfully,

(Signed)

RALPH S. HOSMER,
Superintendent of Forestry.

Plant Inspection Notes

BY E. M. EHRHORN, *Chief Plant Inspector.*

The Federal Horticultural Board passed the following new Rules and Regulations:

Quarantine Notice No. 40 supersedes Quarantine Notice No. 35 concerning the Japanese Beetle in New Jersey by extending the quarantined area and classifying shipments into (1) farm garden and orchard products of all kinds, including fresh or perishable crops; (2) grain and forage crops of all kinds; (3) nursery, ornamental and greenhouse stock and all other plants, including bulbs and cut flowers; and (4) soil, compost and manure other than fresh manure. All these materials shall not be moved or allowed to be moved interstate from said quarantined districts in any manner or method or under conditions other than those prescribed in the rules and regulations in the Quarantine Notice. Mention is made of the various townships of the quarantined territory. This beetle, as stated in a previous note, is not the Japanese Rose Beetle of our Islands and has different habits, feeding in the day time. All interstate shipments from the quarantined area are inspected, certificates are issued and all packages are marked with the name and address of the consignor and consignee.

Notice of Quarantine No. 41, with regulations, was passed on February 21 and prohibits the importation in the United States from all foreign countries and localities of the stalk and all other parts, whether used for packing or other purposes, in the raw or unmanufactured state, of Indian corn or Maize (*Zea mays*), broom corn, sweet sorghums, grain sorghums, Sudan grass, Johnson grass, sugar cane, including Japanese varieties, pearl millet, napier grass, teosinte and Job's tears on account of several dangerous plant pests including so-called European corn borer (*Pyrausta nubilalis*) and other dangerous insects as well as plant diseases existing in Europe, Asia, Africa, Dominion of Canada, Mexico, Central and South America and other foreign countries and localities.

Notice of Quarantine No. 42 was also passed February 21 and prohibits the importation of Indian corn or Maize (*Zea mays*) from any of the states in Mexico. On account of finding that corn seed from that country is more or less contaminated with cotton seed and to avoid the introduction of the Pink bollworm of cotton, this regulation has been passed. All persons contemplating the importation of corn from Mexico shall first make application to the Federal Horticultural Board for a permit as required by regulation (1) of this notice. Any information on this and other subjects will be gladly given by the Chief Plant Inspector of the Board of Agriculture and Forestry.

Division of Forestry

Honolulu, June 14, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of May, 1920:

TREE PLANTING.

During the month 4353 trees were planted out on two reserves on Oahu. On Tantalus 590 koa trees were set out in the small valley among the mountain lots and in the Lualualei Forest Reserve near Kolekole Pass 1198 red gum, 1702 red mahogany, 261 logwood and 602 Australian red cedar trees were planted out.

On May 8, an inspection of the planting was made at the Waiahole Forest Reserve, and in spite of the rather dry weather the trees were found to be growing well.

From Mr. E. Phillips Turner, Secretary of the Department of Forestry at Wellington, New Zealand, a shipment was received, on May 19, of seed of the following three New Zealand timber trees: *Puriri*, *Vitex lucens*; Totara, *Podocarpus totara* and Kauri pine, *Agathis Australis*. These were arranged for through the kindness of Mr. A. Moritzson and have been sowed in the nursery.

CONGRESSIONAL VEGETABLE SEED.

A shipment of 6000 packages of vegetable seed from the U. S. Department of Agriculture was received on May 13, through arrangements made by our Delegate to Congress, Hon. J. K. Kalanianaʻole. These are greatly in demand this year and are being distributed to applicants throughout the Territory.

FOREST FIRES.

The condition of the forest in some parts of the Territory continues to constitute a fire menace on account of the absence of the usual rainfall and it was deemed necessary as a precaution on May 3, to issue a notice under the provisions of Sec. 497, R. L. H. 1915, requiring permits to start fires to clear land for a period of eight months.

The following three fires, which were promptly put under control by Fire Wardens, were reported during the month:

May 1. Woodlawn, Manoa Valley, Honolulu. A fire built to clear land for the planting of pineapples jumped the fire guard at 3 p. m., and burned over about 10 acres of grass and ferns on the side of a hill. It was extinguished in 2½ hours by local men and officers from the Government Nursery.

May 1. Waiakea, Hawaii. A fire started from a cane trash fire and burned over about 300 acres of mostly grass, brush, and young ohia trees on the Richardson land on the 1380 flow near Hilo. Very little of the old forest was touched, and it was extinguished the next day by men working under Fire Warden James Henderson and Ranger MacKenzie.

May 27. The first fire in 16 years in the Koolau Forest Reserve, Maui, started at 3:30 p. m. at Nahiku between Kapaula and Waiohū gulches, but was put under control by 7 p. m. the same day by men working under Fire Warden W. F. Pogue. Above the ditch it burned over 20 acres of forest in the reserve and below the ditch outside of the reserve it burned over 175 acres.

FIELD TRIPS.

Considerable time was spent with President Atkinson in going over forestry matters in the office and on May 20 I accompanied him on an inspection trip through the Tantalus forest and on May 27 on an inspection of forest reserve matters in Waianae Valley, when the new Forest Ranger Mr. J. P. Pico was installed.

FOREST RESERVE HEARING.

The Governor has set Wednesday, June 9, as the date for the hearing to consider the proposed changes in forest reserves recently passed upon by the Board. The hearing will take place at the Government Nursery at 2 p. m., and will be followed at 2:30 p. m. by a hearing to consider arguments for or against the adoption of Rule 5 of the Division of Forestry, which proposes to prohibit tramping on the higher slopes of Manoa and Palolo Valleys in the interest of forest protection.

Respectfully submitted.

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, June 10, 1920.

Superintendent of Forestry, Honolulu, Hawaii.

Sir:—I herewith submit a report of the principal work done during the month of May, 1920:

NURSERY

Distribution of Plants—

	Pot-grown plants	Plants in transplant Boxes	Total
Sold	133		133
Gratis	601	100	701
Total	734	100	834

COLLECTIONS.

Government Realizations—

Collections on account of plants sold.....	\$ 3.20
Rent of office, Nursery grounds, April.....	35.00
Total	\$38.20

Animal Industry Revolving Fund—

Kamehameha Schools—Drugs for animals.....	\$25.35
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PLANTATION COMPANIES AND CORPORATIONS.

Under this heading we have received several orders for trees from plantations on Maui and Hawaii. The trees are wanted for the coming planting season, which commences about the beginning of November. Altogether 70,000 trees have so far been ordered.

MAKIKI STATION.

The work at this station has been as follows: Mixing and sterilizing soil, transplanting trees into pots and boxes, cutting up wood for seed and plant boxes. The latter work is usually done when it is too wet to work outside.

HONOLULU WATERSHED PLANTING.

On the piece of land adjoining the Schmidt property, 590 koa trees were planted. A start has also been made to plant up the piece of land mauka of the Waterhouse property, and which in former years contained a natural pond stocked with fish. This pond has for many years been dry, and the site will make a choice location for a quantity of our Australian red cedar trees, several thousand of which we have on hand ready to plant out.

ADVICE AND ASSISTANCE.

The writer has made the following number of calls and otherwise given advice and assistance:—

Calls made	6
Advice by telephone	8
Advice to people calling	10

SUB-NURSERIES.

Hilo Nursery, Hawaii—

Brother M. Newell reports that he distributed during the past month 920 trees in transplant boxes.

HAIKU NURSERY, MAUI.

In his monthly report, Mr. James Lindsay states that he distributed 190 trees in transplant boxes during the month of May.

KALAHEO NURSERY, KAUAI.

Mr. Joe Rita, Jr., in charge of this nursery, reports that he distributed during the past month 423 trees in tins.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, June 9, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of May the insectary handled 25,400 pupae of the melon fly, from which there were bred 2343 females and 2551 males *Opinus fletcheri*.

The distribution of parasites was as follows:

Opinus Fletcheri.

	Females.	Males
Oahu:		
Kaimuki	300	300
Moiliili	350	350
Waianae	350	350
Pearl Harbor	250	250
Maui:		
Makawao	200	200
Hawaii:		
Paauilo	300	300

Diachasma Tryoni.

Oahu:		
Pearl City	50	50
Kaimuki	100	100
Manoa	300	300
Piikoi St.	100	100
Wahiawa	150	150
Maui:		
Kula	200	200
Makawao	50	50

Diachasma Fullawayi.

Oahu:		
Pearl City	20	20
Manoa	150	150
Piikoi St.	50	50
Wahiawa	10	10

Maui:		
Kula	60	60

Opinus Humilis.

Oahu:		
Pearl City	50	50
Manoa Valley	50	50
Kaimuki	100	100
Wahiawa	100	100

Maui:		
Kula	50	50
Makawao	25	25

Tetrastichus Giffardianus.

Oahu:		
Pearl City	400	
Kaimuki	300	
Manoa	1200	
Wahiawa	300	

Maui:		
Kula	500	
Makawao	500	

Galesus Silvestri.

Oahu:		
Nuuanu Valley	400	
Kaimuki	100	

Dirhinus Giffardi.

Oahu:		
Kaimuki	300	
Nuuanu	350	

Spalangia Cameroni.

Oahu:		
Moanalua Dairy	1600	

Hawaii:		
Volcano House	500	

Since returning from Hawaii, the entomologist has been engaged in the study of the life history of the fern weevil, drug fly predators and termites.

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, May 31, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of May, 1920, as follows:

During the month 75 vessels arrived at the Port of Honolulu, 20 of which carried vegetable matter and 12 vessels came through the Panama Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	711 lots	6436 pkgs
Fumigated	18 "	18 "
Burned	44 "	44 "
Returned	2 "	2 "

Total Inspected 775 lots 6500 pkgs

Of these shipments, 6153 packages arrived as freight, 250 packages as mail and 97 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 19,644 bags of rice from Japan, 1245 mats of rice from China and 1715 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 2910 pieces of baggage belonging to immigrants from foreign countries were examined, from which 25 lots of fruit and 12 lots of vegetables were seized and destroyed.

On May 3, per Siberia Maru, a package of cow pea seed in the mail from France was fumigated precautionarily.

On May 4, per Manoa, 4 pineapple suckers in the mail from the U. S. D. A. for Dr. Lyon were fumigated precautionarily, and are now in quarantine under our supervision. A package of plants also in the mail from the mainland was fumigated on account of a colony of ants (*monomorium* sp.) in the packing.

On May 9, per Makura, a plant in the baggage of a passenger was returned on board, being prohibited.

On May 11, per West Neris, a box of seeds from Java for Dr. Lyon was fumigated precautionarily. Under even date, by the Colombia, two packages of paddy rice were found in the mail from Manila and Japan respectively, and a package of cotton seed from Japan, all of which were seized and destroyed, being contraband. Three packages of Vegetable seeds from Manila in the mail were fumigated, two precautionarily and one on account of weevil indications. A package of pili nuts from Manila was fumigated precautionarily.

On May 16, per Niagara, a package of seed was found in the mail for the Board of Agriculture from Sydney and fumigated precautionarily.

On May 22, per South Bend, a package of cotton seed in possession of a passenger was seized and destroyed, being contraband.

On May 23, per Korea Maru, two baskets of yams in the cargo from China were fumigated on account of ants (*Prenolepis* sp.) A package of paddy rice and a package of bamboo shoots, both in the baggage of immigrants from Japan, were seized and destroyed, being prohibited. A package of walnuts in the possession of a passenger from China was fumigated precautionarily. Two packages of paddy rice, one from Manila and the other from Japan, were found in the mail, seized and destroyed. Two packages of tree seeds in the mail from Siam for Dr. Lyon and a package of seed from Japan were fumigated precautionarily.

Referring to my report of March 31, regarding a bag of rice paddy in the cargo from Japan, beg to report that the importer waived all claims and the bag was turned over to me and burned May 7.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of six steamers at the Port of Hilo. Four carried vegetable matter consisting of 123 lots and 1349 parcels, all clean.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of eight vessels at the Port of Kahului. Two carried vegetable matter consisting of eight lots and 350 parcels, all passed.

INTER-ISLAND INSPECTION.

Fifty-nine steamers plying between Honolulu and the other Island Ports were attended, and the following shipments passed as free from pests:

Taro	508 bags
Vegetables	378 pkgs
Fruit	339 "
Plants	115 "
Seeds	16 "
Pineapple Shoots	10 "

Total Passed 1366 pkgs

Twenty-three packages of plants and one package of fruit were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, June 18, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I beg to submit herewith my report on the work of the Division of Animal Industry for the month of May, 1920:

HEMORRHAGIC SEPTICEMIA AMONG THE CATTLE IN KAU, HAWAII:

• On April 30, a wireless was received from the Deputy Territorial Veterinarian for the Hilo district that hemorrhagic septicemia had broken out among the cattle on the Kaalualu Ranch, Naalehu, Kau, and requesting the presence of the Territorial Veterinarian with 2500 doses of vaccine.

Pursuant to official instructions, I left the next day and arrived at Naalehu on May 2. The same day post-mortem examinations were made of two cows which had recently died and Dr. Elliot's diagnosis confirmed.

At that time between twenty and thirty head of plantation stock, and a dozen or more animals belonging to homesteaders had died. As these deaths had occurred in widely-scattered pastures, the situation appeared somewhat serious, and a message was sent to this Board requesting that 10,000 doses of vaccine be ordered without delay.

Vaccination was begun the next day, May 3, and from then until the 16th, a total of 4934 plantation animals and 1372 homesteaders'

animals were vaccinated. During the same period the total number of deaths had increased to 120 head. Of these, between thirty and forty were examined post-mortem, while a total of twenty-four sick animals were treated with curative serum.

On the tenth day after beginning vaccination, the disease had been practically checked. Only one case occurred subsequently, and that was not until the 27th or 28th, and was possibly an animal which had escaped vaccination.

NATURE OF THE DISEASE.

Hemorrhagic septicemia is an acute inflammatory disease characterized by the appearance of bloody exudations under the skin and in the various organs of the body. Gelatinous swellings and exudations are also found in most cases. As a rule the disease attacks either the thoracic organs or else the abdominal form may be the initial one.

In the first case, there is a croupous pneumonia, which speedily puts an end to the animal's life, the disease lasting only a few hours. In the abdominal form there is extensive hemorrhagic inflammation of the intestines, especially the small intestine, though sometimes even the fourth or true stomach may be found filled entirely with blood. In some cases both forms occur simultaneously and the animal rarely survives for more than twelve hours.

Later in an outbreak the disease becomes less acute, the animals living from three to four days and perhaps longer. In these cases, curative treatment may be resorted to, but of the twenty-four animals which were treated during this outbreak, not more than six survived and all of them came under treatment at the time when the symptoms were just beginning to manifest themselves. This fact would indicate that the outbreak was of an extremely virulent nature, and while it was impossible to say how many animals would have died if they had not been vaccinated so promptly, it is safe to surmise that the number of deaths would have greatly exceeded the 120 head recorded.

INFECTIOUS ABORTION ON MAUI.

On the 19th instant, a wireless was received from the Deputy Territorial Veterinarian on Maui requesting my presence without delay. As there was a possibility of catching the M. S. "Kilauea" at Kealahou Bay, I left Naalehu the following day, having previously arranged for interviews with cattlemen throughout Kona. I learned on my way that while a good many cattle had died there on account of the drought, no cases of any disease resembling hemorrhagic septicemia had been noticed. As most of the dead animals had been skinned, the owners could not have failed to notice the characteristic bloody spots under the hide, and I am therefore inclined to believe that the disease so far has confined itself to the Naalehu district.

On Maui an outbreak of infectious abortion among the milch cows in one of the largest dairies on the island had caused considerable alarm, and as this disease is one of very recent origin in these islands, the owners were anxious to have the diagnosis confirmed and to obtain advice as to treatment and prevention. I am pleased to report, however, that Dr. Fitzgerald had taken every precaution possible to prevent the further spread of the disease and that he had the situation well in hand. After visiting a number of dairies from Haiku to Lahaina with him, I returned to Honolulu.

On May 30, I was advised by the manager of the Hutchinson Plantation Company that only the one case above referred to had occurred since my departure, and that the epidemic seemed to be completely checked. This report has at the present writing been confirmed by Dr.

Elliot. At the same time Dr. Fitzgerald reports that he has vaccinated thirty head of cattle in the infected dairies, and that no more cases have occurred.

That the Animal Industry Revolving Fund created by the last Legislature, authorizing this office to keep on hand and replenish—without red tape—supplies of vaccines and serums for the immediate suppression of devastating outbreaks like the Kau epidemic, has served its end, would seem incontrovertible.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 15, 1920.

Dr. V. A. Norgaard, Chief Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu.

Sir:—I beg to submit the following report for the month of May:

TUBERCULOSIS CONTROL.

The following dairies were tested (tuberculin):

	Tested.	Passed.	Condemned.
Kemo Farm	133	133	0
T. F. Farm	93	92	1
P. F. Neves	16	16	0
F. Fugisue	19	19	0
J. Yamane	3	3	0
Lum Ho	3	3	0
M. Kurihara	5	5	0
Frank Andrade	43	43	2
K. Mitsunaga	10	10	0
M. Freitas	11	11	0
J. A. B. Vierra	1	1	0
Waialae Ranch	285	255	29
Lunalilo Home	1	1	0

From the above list it will be seen that a total of 625 head were tested, out of which number 593 were passed and 32 condemned and branded.

Besides the above, three head of condemned cows were post-mortemed at local abattoirs.

CONTAGIOUS EPITHELIOMA.

One thousand c. c. of vaccine for this disease was made up in the laboratory, of which amount about 500 c. c. have been distributed among various owners.

IMPORTATION OF LIVE STOCK.

During the past month 45 vessels were boarded by the Inspector, and the following found to carry livestock for this Territory.

S. S. Manoa, San Francisco: 32 crates poultry
S. S. Logan, San Francisco: 1 goat; 2 cats, J. Marsh.
S. S. Maui, San Francisco: 1 Boston bull terrier, E. B. Hess.
S. S. Colombia, Orient: 2 Chow dogs, W. G. Hall.
S. S. West Nilus, San Francisco: 1 fox terrier, J. J. Smith; 12 mules, Cal. Packing Co.; 30 mules, Haiku F. & P. Co.

S. S. Lurline, San Francisco: 1 horse, F. E. Richardson; 3 horses, John O'Rourke; 4 horses, Alexander & Baldwin, Ltd.: 12 mules, Alexander & Baldwin, Ltd.; 25 crates poultry.

S. S. Sonoma, San Francisco: 1 Airedale, J. E. Boyle.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

By Authority

PROCLAMATION OF MODIFICATION OF THE OLAH FOREST PARK RESERVE, DISTRICT OF PUNA, ISLAND AND COUNTY OF HAWAII, TERRITORY OF HAWAII.

Under and by virtue of the authority vested in me by the provisions of Chapter 37 of the Revised Laws of Hawaii of 1915, and of every other power me hereunto enabling, I, C. J. McCARTHY, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given all as in said laws provided, do hereby modify the boundary and increase the area of Section C of the Olah Forest Park Reserve in the District of Puna, Island and County of Hawaii, Territory of Hawaii, created and set apart by Proclamation of the Governor of Hawaii on August 20, 1914, and as provided by law, I do now and hereby SET APART as an integral part of Section C of the Olah Forest Park Reserve, that certain portion of land in Olah belonging to the Territory of Hawaii, containing an area of 30,000 square feet, more or less, in the District of Puna, Island and County of Hawaii, Territory of Hawaii, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked Government Survey Reg. Map No. 2577 and "F. G. Snow to Territory of Hawaii, Portion of Lot 328, Olah Reservation Lots, being portion of Grant 4237 to W. A. McKay, Olah, Puna, Hawaii," and a description accompanying the same numbered C. S. F. 3028, which said description now on file in the said Survey Department is as follows:

F. G. Snow to Territory of Hawaii
Portion of Lot 328, Olah Reservation Lots,
Being portion of Grant 4237, to W. A. McKay,
Olah, Puna, Hawaii.
C. S. F. 3028.

Beginning at the South corner of this lot, being also the South corner of Lot 328, Olah Reservation Lots, and the North corner of Volcano Road and a 30 foot side road, the coordinates of said point of beginning referred to Government Survey Trig. Station "Olah" being 43,200.5 feet South and 34,839.7 feet West, as shown on Government Survey Registered Map No. 2577, and running by true azimuths:

1. 124° 12' 150.0 feet along 30 foot side road;
 2. 214° 12' 200.0 feet along remaining portion of Lot 328, Olah Reservation Lots;
 3. 304° 12' 150.0 feet along Forest Reserve (government land);
 4. 34° 12' 200.0 feet along Volcano Road to the point of beginning.
- Area, 30,000 square feet.

In witness whereof, I have hereunto set my hand and

(Seal) caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol in Honolulu, this 21st day of June,
A. D. 1920.

C. J. McCARTHY,
Governor of Hawaii.

By the Governor:
CURTIS P. IAUKEA,
Secretary of Hawaii.

**PROCLAMATION OF WITHDRAWAL OF CERTAIN LANDS FROM
THE OLAA FOREST RESERVE, DISTRICT OF PUNA, ISLAND
AND COUNTY OF HAWAII, TERRITORY OF HAWAII.**

Under and by virtue of the authority vested in me by the provisions of Chapter 37 of the Revised Laws of Hawaii of 1915, and of every other power me hereunto enabling, I, C. J. McCARTHY, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given all as in said laws provided, do hereby WITHDRAW and ELIMINATE from the Olaa Forest Reserve, in the District of Puna, Island and County of Hawaii, Territory of Hawaii, created and set apart by Proclamation of the Governor of Hawaii on December 31 1918, that certain portion of the government land called Olaa, containing 83.10 acres, more or less, in the District of Puna, Island and County of Hawaii, Territory of Hawaii, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked Government Survey Reg. Map No. 2179 and "Lease, S. Kanamori Application, Portion of the Government Land of Olaa, Olaa, Puna Hawaii, Within Olaa Forest Reserve," and a description accompanying the same numbered C. S. F. 3299, which said description now on file in the said Survey Department is as follows:

LEASE.

S. Kanamori Application.
Portion of the Government Land of Olaa,
Olaa, Puna, Hawaii.
Within OLAA FOREST RESERVE.
C. S. F. 3299.

Beginning at the East corner of this piece and the Northwest corner of OLAA FOREST PARK RESERVE, Section "A", the coordinates of said point of beginning referred to Government Survey Trig. Station "Olaa" being 48,348.0 feet South and 42,412.0 feet West, as shown on Government Survey Registered Map No. 2179, and running by true azimuths:

1. 34° 12' 1750.0 feet along OLAA PARK FOREST RESERVE, Section "A," across 30 foot road and along remaining portion of OLAA FOREST RESERVE;
2. 124° 12' 2069.0 feet along remaining portion of OLAA FOREST RESERVE;
3. 214° 12' 1750.0 feet along same and across 30 foot road, and along Grant 4324 to F. Brughelli;
4. 304° 12' 2069.0 feet along Lots 381 and 380 of the Olaa Reservation Lots, to the point of beginning.
Area, 83.10 acres.

In witness whereof, I have hereunto set my hand and
(Seal) caused the Great Seal of the Territory of Hawaii to be
affixed.

Done at the Capitol in Honolulu, this 21st day of June.
A. D. 1920.

C. J. McCARTHY,
Governor of Hawaii.

By the Governor:
CURTIS P. LAUKEA,
Secretary of Hawaii.

**PROCLAMATION OF WITHDRAWAL OF CERTAIN LAND FROM
THE HONOLULU WATERSHED FOREST RESERVE, DISTRICT
OF HONOLULU, CITY AND COUNTY OF HONOLULU, ISLAND
OF OAHU, TERRITORY OF HAWAII.**

Under and by virtue of the authority vested in me by the provisions of Chapter 37 of the Revised Laws of Hawaii of 1915, and of every other power me hereunto enabling, I, C. J. McCARTHY, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given all as in said laws provided, do hereby **WITHDRAW** and **ELIMINATE** from the Honolulu Watershed Forest Reserve in the District of Honolulu, City and County of Honolulu, Island of Oahu, Territory of Hawaii, created and set apart by Proclamation of the Acting Governor of Hawaii, on October 13, 1913, that certain portion of government land on Tantalus Heights containing an area of 3,230 square feet, more or less, in the District of Honolulu, City and County of Honolulu, Island of Oahu, Territory of Hawaii, more particularly described by and on a map made by Geo. F. Wright, which said map is now on file in the Government Survey Department of the Territory of Hawaii marked "Application to Purchase by Parke Estate, Portion of Government Land Within the Honolulu Watershed Forest Reserve, Tantalus Heights, Honolulu," and a description accompanying the same numbered C. S. F. 3327, which said description now on file in said Survey Department is as follows:

Portion of Government Land
within the Honolulu Watershed Forest Reserve,
Tantalus Heights, Honolulu.
Also covered by Executive Order No. 6, Makiki Park and
Reservation.
C. S. F. 3327.

Beginning at the East corner of this piece, being also the most northerly corner of Lot 14, Tantalus Lots (Grant 4544 to A. V. Gear), and being also the West corner of Lot 13, Tantalus Lots (Grant 4543 to Fred Harrison), the coordinates of said point of beginning referred to Government Survey Trig. Station "Nahuiua" being 379.0 feet South and 2223.4 feet East, and running by true azimuths:

1. 64° 00' 96.8 feet along said Lot 14;
 2. 129° 51' 11.3 feet along government land;
 3. 217° 20' 52.0 feet along same;
 4. 230° 35' 57.6 feet along same;
 5. 335° 20' 47.0 feet along same and 16 foot road, to the point of beginning.
- Area, 3,230 square feet.

In witness whereof, I have hereunto set my hand and

(Seal) caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol in Honolulu this 21st day of June
A. D. 1920.

C. J. McCARTHY,
Governor of Hawaii.

By the Governor:
CURTIS P. LAUKEA,
Secretary of Hawaii.

PROCLAMATION OF MODIFICATION OF BOUNDARY OF THE LIHUE-KOLOA FOREST RESERVE, DISTRICT OF PUNA, ISLAND AND COUNTY OF KAUAI.

Under and by virtue of the authority vested in me by the provisions of Chapter 37 of the Revised Laws of Hawaii of 1915, and of every other power me hereunto enabling, I, C. J. McCARTHY, Governor of Hawaii with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given all as in said laws provided, do hereby MODIFY the boundary and change the area of the Lihue-Koloa Forest Reserve, in the District of Puna, Island and County of Kauai, Territory of Hawaii, created and set apart by Proclamation of the Governor of Hawaii, on June 5, 1909, by eliminating therefrom in the land of Hanamaulu areas amounting to 230.40 acres and by adding thereto in the land of Hanamaulu areas amounting to 11.60 acres, and by eliminating therefrom in the land of Wailua areas amounting to 438.85 acres, more or less which modification of boundary is more particularly shown by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department marked, "Lower Line of Lihue-Koloa Forest Reserve, from 'Puuopae' to 'Kilohana,' through Lands of Wailua and Hanamaulu," and a description accompanying the same numbered C. S. F. 1966, which said description now on file in the said Survey Department and hereby approved as now constituting the official description of the Lihue-Koloa Forest Reserve, differs from the original description that forms a part of the proclamation of the Lihue-Koloa Forest Reserve by substituting the following courses in place of Courses 28 to 34, both inclusive, in the original description (C. S. F. 1966):

Proposed Amendment of the Lower Boundary of the

LIHUE-KOLOA FOREST RESERVE

through the lands of Hanamaulu and Wailua,
Island of Kauai.

By substituting the following courses in place of Courses 28 to 34 both inclusive:

28. Thence across Halemaumau along forest fence to a Forest Reserve Monument, the direct azimuth and distance being: 153° 01' 9659.3 feet;
29. Thence still across Hanamaulu along forest fence to near edge of South bank of the South branch of the Wailua River, the direct azimuth and distance being: 197° 07' 2956.4 feet;
30. Thence still across Hanamaulu along forest fence to near top edge of the North bank of the South branch of the Wailua River, the direct azimuth and distance being: 238° 41' 4195.9 feet;
31. Thence across Wailua along forest fence, the direct azimuth and distance being: 203° 49' 3428.6 feet;

32. Thence still across Wailua along forest fence to a Forest Reserve Monument, the direct azimuth and distance being: $169^{\circ} 13'$ 4251.2 feet;
33. Thence still across Wailua along forest fence, the direct azimuth and distance being: $182^{\circ} 45'$ 2650.7 feet;
- 34-A. Thence still across Wailua along forest fence to the South bank of the North branch of the Wailua River, the direct azimuth and distance being: $249^{\circ} 50'$ 2680.0 feet;
- 34-B. Thence still across Wailua crossing the North branch of the Wailua River to the end of forest fence on the North bank of said river, the direct azimuth and distance being: $147^{\circ} 57'$ 1672.9 feet;
- 34-C. Thence still across Wailua, along forest fence, the direct azimuth and distance being: $200^{\circ} 03'$ 4733.8 feet;
- 34-D. Thence still across Wailua along forest fence to end of fence on the South bank of the South Branch of the Opaikaa Stream, the direct azimuth and distance being: $276^{\circ} 44'$ 2219.0 feet;
- 34-E. Thence still across Wailua, across said stream to a Forest Reserve Monument on the Kamochoopulu Ridge, and on the boundary of Wailua and North Oloheua, the direct azimuth and distance being: $254^{\circ} 24'$ 1581.1 feet;

and by adding the following to the original description:

"Excepting and reserving therefrom the bottom lands along the North Fork of the Wailua River which are suitable for agricultural purposes; such agricultural lands to be determined jointly by the Superintendent of Forestry and the Commissioner of Public Lands.

And, as provided by law, I do hereby recommend the elimination from the Lihue-Koloa Forest Reserve of areas amounting to 230.46 acres in the land of Hanamaulu, do hereby recommend and approve as an integral part of the Lihue-Koloa Forest Reserve areas amounting to 11.60 acres in the land of Hanamaulu, and do hereby eliminate from the Lihue-Koloa Forest Reserve areas amounting to 438.85 acres, more or less, in the land of Wailua as shown in the above description.

In witness whereof, I have hereunto set my hand and (Seal) caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol in Honolulu this 21st day of June, A. D. 1920.

C. J. McCARTHY,
Governor of Hawaii.

By the Governor:

CURTIS P. LAUKEA,
Secretary of Hawaii.

PROCLAMATION OF MODIFICATION OF BOUNDARY OF THE KEALIA FOREST RESERVE, DISTRICT OF KAWAIIHAU.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 37 of the Revised Laws of Hawaii of 1915, and of every other power me hereunto enabling, I, C. J. McCARTHY, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given all as in said laws provided, do hereby modify the boundary and change the area of the Kealia Forest Reserve in the District of Kawaiihau, Island and County of Kauai, Territory of Hawaii, created and set apart by Proclamation of the Acting Governor of Hawaii on March 9, 1906, by changing certain courses in the

original description that forms a part of the proclamation of the Kealia Forest Reserve, which changes are more particularly shown by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked Government Survey Reg. Maps Nos. 2282, 2449 and 2452 and "Kealia Forest Reserve" and a description accompanying the same, numbered C. S. F. 2475, which said description now on file in said Survey Department is as follows:

KEALIA FOREST RESERVE.

Including Portions of the Lands of Anahola, Kamalomaloo, Kealia, and Kapaa, District of Kawaihau, Island of Kauai.
C. S. F. 2475.

Beginning at a Forest Reserve Monument at a point called "Puu Elaula" on the boundary of the lands of Aliomanu and Anahola, the true azimuth and distance from said point of beginning to Government Survey Trig. Station "North Base" in Aliomanu being $249^{\circ} 09' 54.92.1$ feet and to Government Survey Trig. Station "Waiawaawa" is $191^{\circ} 33' 8703.4$ feet, as shown on Government Survey Registered Maps Nos. 2282, 2449 and 2452, and running by true azimuths:—

1. $330^{\circ} 21' 30''$ 875.4 feet to a \perp on stone at a place called "Paepae";
2. $3^{\circ} 14'$ 3631.0 feet to a place called "Panikiioi";
3. Thence to the North bank of the Anahola River and following said North bank to a 4-inch pipe on pali, the direct azimuth and distance being:— $109^{\circ} 48' 9569.4$ feet;
4. $46^{\circ} 15'$ 1360.0 feet, more or less, across gulch and Anahola River to "Puaa" Trig. Station, marked with a $1\frac{1}{2}$ -inch galvanized pipe;
5. $96^{\circ} 33'$ 1880.0 feet to a 4-inch pipe;
6. $73^{\circ} 33'$ 1375.0 feet to "Peekoapu" Trig. Station, marked by a $1\frac{1}{2}$ -inch galvanized pipe;
7. $62^{\circ} 47'$ 824.0 feet to a 4-inch pipe;
8. $38^{\circ} 53'$ 1480.0 feet to a 4-inch pipe;
9. $82^{\circ} 37'$ 687.5 feet to a 4-inch pipe;
10. $1^{\circ} 51'$ 367.2 feet to the boundary of Kamalomaloo and Anahola at a point marked with an arrow on stone;
11. $335^{\circ} 40'$ 1220.0 feet, more or less, to a 4-inch pipe;
12. $65^{\circ} 35'$ 2995.0 feet, more or less, to a 4-inch pipe at the Northeast corner of Grant 4262 to the Makee Sugar Co., and from this point Government Survey Trig. Stations "Puu Awa" bear $142^{\circ} 14'$ and "Puu Kinui" $325^{\circ} 22'$;
13. $17^{\circ} 00'$ 560.0 feet, more or less, along Grant 4262 to the Makee Sugar Co.;
14. $352^{\circ} 10'$ 898.0 feet, more or less, along Grant 4262 to the Makee Sugar Co., to the point on the boundary between Kamalomaloo and Kealia;
15. $268^{\circ} 15'$ 180.0 feet, more or less, along Grant 4262 to Makee Sugar Co.;
16. $275^{\circ} 05'$ 862.6 feet along Grant 4262 to Makee Sugar Co.;
17. $275^{\circ} 01'$ 171.6 feet along Grant 4262 to Makee Sugar Co.;
18. $265^{\circ} 00'$ 610.5 feet along Grant 4262 to Makee Sugar Co.;
19. $304^{\circ} 16'$ 95.7 feet along land of Kamalomaloo;
20. $276^{\circ} 09'$ 709.5 feet along land of Kamalomaloo;
21. $290^{\circ} 34'$ 240.2 feet along land of Kamalomaloo;
22. $280^{\circ} 02'$ 1359.6 feet along land of Kamalomaloo;
23. $314^{\circ} 13'$ 735.9 feet along land of Kamalomaloo;
24. $295^{\circ} 20'$ 573.5 feet along land of Kamalomaloo to a Forest Reserve Monument on the boundary of Kamalomaloo and Kealia at a place called "Kaneha";

25. 25° 41' 3192.6 feet across land of Kealia to Government Survey Trig. Station "Puu Kinui," marked by a Forest Reserve Monument.
26. 350 34' 2821.7 feet across the land of Kealia across Mimino Gulch to Government Survey Trig. Station "Puu Lawii" on the boundary of Kealia and Kapaa;
27. 23° 16' 917.4 feet across the land of Kapaa to a + on stone at Lot 56, Kapaa Homesteads;
28. 95° 05' 563.3 feet along Lot 56, Kapaa Homesteads, to a + on stone;
29. 115° 28' 529.7 feet along Lot 55, Kapaa Homesteads, to a + on stone.
30. 90° 04' 376.6 feet along Lot 55, Kapaa Homesteads, to a + on stone;
31. 29° 54' 333.8 feet along Lot 55, Kapaa Homesteads, to a 1½-inch pipe;
32. 39° 22' 282.8 feet along Lot 55, Kapaa Homesteads, to a + on stone;
33. 65° 05' 104.6 feet along Lot 55, Kapaa Homesteads, to a + on stone;
34. 61° 45' 135.1 feet along Lot 55, Kapaa Homesteads, to a + on stone;
35. 20° 21' 109.0 feet along Lot 55, Kapaa Homesteads, to a + on stone;
36. 343° 53' 177.9 feet along Lot 55, Kapaa Homesteads, to a + on stone;
37. 325° 40' 154.1 feet along Lot 55, Kapaa Homesteads, to a + on stone;
38. 287° 48' 114.4 feet along Lot 55, Kapaa Homesteads, to a + on stone;
39. 274° 20' 219.1 feet along Lot 55, Kapaa Homesteads, to a + on stone;
40. 355° 01' 172.7 feet along Lot 55, Kapaa Homesteads, to a + on stone;
41. 335° 53' 169.4 feet along Lot 55, Kapaa Homesteads, to a + on stone;
42. 250° 03' 105.0 feet along Lot 55, Kapaa Homesteads, to a + on stone;
43. 295° 37' 206.7 feet along Lot 55, Kapaa Homesteads, to a + on stone;
44. 1° 20' 30.0 feet across Akulikuli road to a 1½-inch pipe, from this point the Government Survey Trig. Station "Nonou" bears 345° 45';
45. 58° 47' 352.2 feet along Lot 53, Kapaa Homesteads, to a + on stone;
46. 115° 28' 137.8 feet along Lot 53, Kapaa Homesteads, to a + on stone.
47. 68° 21' 350.5 feet along Lot 53, Kapaa Homesteads, to a + on stone;
48. 102° 45' 382.7 feet along Lot 48, Kapaa Homesteads, to a + on stone;
49. 120° 28' 384.6 feet along Lot 47, Kapaa Homesteads, to Government Survey Trig. Station, "Piliamoo" (marked by a 1½-inch pipe);
50. 128° 45' 296.2 feet along Lot 47, Kapaa Homesteads, to a + on stone;
51. 77° 44' 665.1 feet along Lot 46, Kapaa Homesteads, to a + on stone;
52. 77° 03' 271.8 feet along Lot 45, Kapaa Homesteads, to a + on stone;

33. 64° 58' 388.6 feet along Lot 45, Kapaa Homesteads, to a + on a large flat rock;
34. 93° 51' 30.2 feet across Piliamoo Road to a + on stone;
35. 93° 34' 424.3 feet along Lot 44, Kapaa Homesteads, to a + on stone;
36. 95° 09' 250.0 feet along Lot 44, Kapaa Homesteads, to a + on stone;
37. 95° 09' 347.0 feet along Lot 43, Kapaa Homesteads, to a + on stone;
38. 90° 13' 550.6 feet along Lot 43, Kapaa Homesteads, to a + on stone;
39. 95° 10' 579.6 feet along Lot 42, Kapaa Homesteads, to a + on stone;
40. 90° 12' 434.5 feet along Lot 41, Kapaa Homesteads, to a + on stone;
41. 34° 34' 641.8 feet along Lot 41, Kapaa Homesteads, to a 1½ inch pipe;
42. 74° 51' 133.5 feet along Lot 26, Kapaa Homesteads, to a + on stone;
43. 51° 53' 297.6 feet along Lot 26, Kapaa Homesteads, to a + on stone;
44. 51° 53' 312.6 feet along Lot 25, Kapaa Homesteads, to a + on stone;
45. 91° 26' 196.4 feet along Lot 20, Kapaa Homesteads, to a + on stone;
46. 53° 07' 295.1 feet along Lot 20, Kapaa Homesteads, to a + on stone;
47. 35° 17' 42.1 feet along Lot 20, Kapaa Homesteads, to a + on stone;
48. 35° 17' 30.0 feet across Kahuna road to a + on stone;
49. 35° 17' 59.7 feet along Lot 20A, Kapaa Homesteads, to a + on stone;
50. 46° 53' 108.2 feet crossing Makaleha Stream to a + on stone;
51. 22° 12' 150.1 feet along Lot 19, Kapaa Homesteads, to a + on stone;
52. 20° 28' 355.6 feet along Lot 19, Kapaa Homesteads, to a + on stone;
53. 22° 47' 195.1 feet along Lot 18, Kapaa Homesteads, to a + on stone;
54. 22° 47' 144.4 feet along Lot 17, Kapaa Homesteads, to a + on stone;
55. 23° 34' 230.7 feet along Lot 11, Kapaa Homesteads, to a + on stone;
56. 25° 34' 130.8 feet along Lot 9, Kapaa Homesteads, to a + on stone;
57. 50° 28' 207.7 feet along Lot 9, Kapaa Homesteads, to a + on stone;
58. 358° 02' 294.8 feet along Lot 8, Kapaa Homesteads, to a + on stone;
59. 49° 19' 206.2 feet crossing the Moalepe Stream to a + on stone at the Northwest corner of Lot 5A;
60. 92° 02' 165.1 feet along Lot 4A, Kapaa Homesteads, to a + on stone;
61. 40° 20' 69.8 feet along Lot 4A, Kapaa Homesteads, to a + on stone;
62. 100° 04' 29.0 feet crossing Moalepe Stream to a + on stone;
63. 85° 41' 34.7 feet along Lot 3A, Kapaa Homesteads, to a + on stone;
64. 86° 41' 272.9 feet along Lot 3, Kapaa Homesteads, to a + on stone;
65. 64° 44' 300.5 feet along Lot 3, Kapaa Homesteads, to a + on stone;
66. 32° 27' 304.9 feet along Lot 3, Kapaa Homesteads, to a + on stone;
67. 12° 32' 301.9 feet along Lot 2, Kapaa Homesteads, to a + on stone;
68. 36° 00' 940.0 feet along foot-hills along remainder of Kapaa (leased land);

89. 62° 00' 1200.0 feet along foot-hills along remainder of Kapaa (leased land);
90. 560° 00' 750.0 feet along remainder of Kapaa (leased land) and across the Moalepe Stream to Government Survey Trig. Station "Pukali," marked by a Forest Reserve Monument;
91. 75° 50' 20.0 feet along the LIHUE-KOLOA FOREST RESERVE along the land of Waipouli;
92. 105° 10' 1202.2 feet along the LIHUE-KOLOA FOREST RESERVE along the land of Waipouli;
93. 114° 08' 1083.7 feet along the LIHUE-KOLOA FOREST RESERVE along the land of Waipouli;
94. 69° 24' 462.0 feet along the LIHUE-KOLOA FOREST RESERVE along the land of Waipouli;
95. 92° 07' 330.0 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
96. 58° 31' 304.9 feet along the LIHUE-KOLOA FOREST RESERVE along the land of Waipouli;
97. 93° 08' 326.7 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
98. 113° 40' 509.0 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli to "Kainamanu" Trig. Station;
99. 136° 15' 138.3 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
100. 89° 42' 420.9 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli to a 2½ inch pipe;
101. 167° 50' 253.5 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
102. 126° 52' 231.0 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
103. 152° 39' 153.5 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
104. 146° 44' 352.9 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
105. 135° 10' 84.7 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
106. 158° 37' 96.9 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
107. 114° 00' 130.0 feet along the LIHUE-KOLOA FOREST RESERVE along land of Waipouli;
108. 90° 12' 150.0 feet along the LIHUE-KOLOA FOREST RESERVE to a concrete post at the head of the land of Waipouli and the junction of the lands of Kapaa and North Oloheua at a place called "Kahilimalapai";
109. Thence along the LIHUE-KOLOA FOREST RESERVE up watershed of ridge along the land of North Oloheua to a pipe at a place called "Pehuaola," the direct azimuth and distance being: 150° 59' 5544.9 feet;
110. Thence following the watershed of the ridge and along the lands of Waialua and Kalihiwai to "Makaleha," the Northwest corner of Kapaa and the Southwest corner of Kealia, the direct azimuth and distance being: 183° 48' 4427.7 feet;
111. 223° 57' 1969.0 feet along the watershed of the ridge along the Haleleu Forest Reserve along the land of Kalihiwai, to a point called "Tiptop";
112. 177° 21' 1419.0 feet along the watershed of the ridge along the HALELEU FOREST RESERVE along the land of Kalihiwai, to a point called "Pueo" (marked by an iron pipe), which is the Northwest corner of Kapaa and the Southwest corner of Anahola;

113. 141° 20' 1537.0 feet along the watershed of the ridge along the HALELEA FOREST RESERVE along the land of Kalihiwai, to a point called "Last Peak";
114. 140° 42' 6526.1 feet along the watershed of the ridge along the HALELEA FOREST RESERVE along the land of Kalihiwai, to a point called "Namahana" (marked by an iron pipe) at the Northwest corner of Anahola;
115. 267° 20' 4092.0 feet along the MOLOAA FOREST RESERVE to a peak;
116. 249° 00' 726.0 feet along the MOLOAA FOREST RESERVE to top of peak;
117. 273° 00' 5214.0 feet along the MOLOAA FOREST RESERVE to top of Malamalamaiki Peak;
118. 245° 15' 6732.0 feet along the MOLOAA FOREST RESERVE along ridge;
119. 256° 00' 1254.0 feet along the MOLOAA FOREST RESERVE to Keaooopuu where old road crosses range;
120. 236° 15' 4356.0 feet along ridge along MOLOAA FOREST RESERVE to bend in ridge;
121. 351° 00' 1386.0 feet along ridge along the MOLOAA FOREST RESERVE;
122. 332° 30' 891.0 feet along ridge along the MOLOAA FOREST RESERVE to Puukakea;
123. 280° 20' 2442.0 feet along ridge along the MOLOAA FOREST RESERVE;
124. 261° 00' 1452.0 feet along ridge along the MOLOAA FOREST RESERVE to Puu Eu, the highest peak;
125. 290° 00' 4155.0 feet along ridge along the MOLOAA FOREST RESERVE to Keaweaumakua;
126. 292° 00' 2772.0 feet along the MOLOAA FOREST RESERVE to a pipe and large ahu on summit of Kikoo;
127. 253° 18' 3049.0 feet down face of ridge along the MOLOAA FOREST RESERVE along the land of Aliomanu to the point of beginning.

AREAS.

Kapaa (Government)	2290 acres, more or less;
Kealia	2470 acres, more or less;
Kamalomaloo (Government)	630 acres, more or less;
Anahola (Government)	3660 acres, more or less;
Total	9050 acres, more or less;

And, as provided by law, I do hereby SET APART as a part of the KEALIA FOREST RESERVE those portions of the government lands of Kapaa (2290 acres), Kamalomaloo (630 acres), and Anahola (3660 acres), more or less, which lie within the metes and bounds of the above described KEALIA FOREST RESERVE.

In witness whereof, I hereunto set my hand and cause
(seal) the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol in Honolulu this 21st day of June,
A. D. 1920.

C. J. MCCARTHY,
Governor of Hawaii.

By the Governor:
CURTIS P. IAUKEA,
Secretary of Hawaii.

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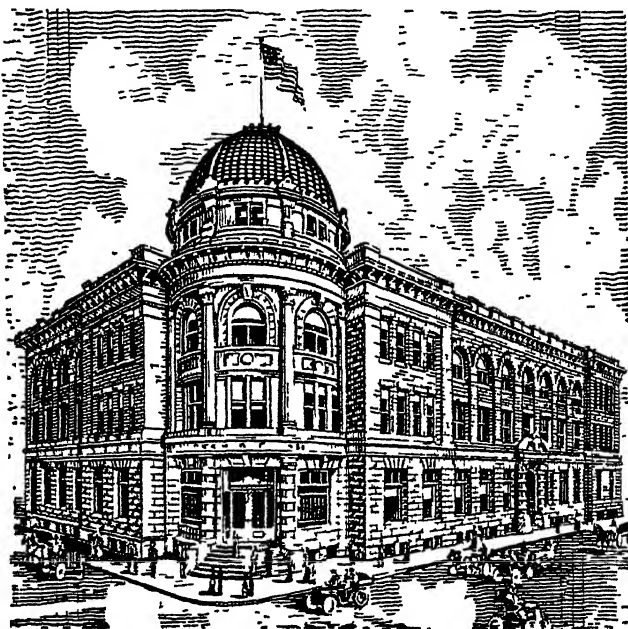
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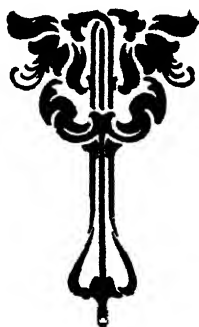
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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEEDLINGS FOR SALE AT GOVERNMENT NURSERIES.

The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papapaholahola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

HILO, HAWAII. Nursery at the Boys' Catholic School in charge of Bro. Matthias Newell, Hilo.

PRICES: Plants in seed boxes \$1.00 per 1000. Transplants in boxes 1c each. Transplants in pots 2½c each.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

PUBLICATIONS FOR DISTRIBUTION.

The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, AUGUST, 1920.

No. 8

It is with the deepest regret that we announce the resignation of Mr. Daniel Logan as Editor of the "Forester," which was submitted on July 9, and which perforce had to be accepted because of his moving away from the Territory. Mr. Logan's faithful services in connection with the Board's publication have been greatly appreciated and he will be missed by all of his Honolulu friends.

The report of the Board, printed in this issue, recounts the activities of the four divisions during the fiscal year ended June 30, 1920.

The new bovine tuberculosis regulations approved by the Governor on July 6, 1920, appear in this issue.

Plans are being made to relocate and enlarge the tree nursery at Hilo, so as to make a larger number of trees available for distribution on the big island.

The crop of koa seeds in the forests back of Honolulu appears to be better than usual this year and an effort is being made to secure a large supply for reforestation work by the Division of Forestry.

The breeding of parasites on the melon fly and fruit fly continues at the insectary of the Entomologist, and these are sent out free of charge upon request.

Mr. Harry L. Denison on June 1, began his duties as Forest Ranger for the Kohala Mt. and Hamakua Pali Forest Reserves in co-operation with the forestry work of the H. S. P. A.

Some of the vegetable seed from Washington, D. C., is still available at the Government Nursery and packages will be sent out free of charge upon application to Mr. David Haughs, Box 207, Honolulu.

REPORT OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY FOR THE FISCAL YEAR ENDED JUNE 30, 1920.

The work of this Board has, as during the previous fiscal year, been confined to the four main lines of work of forestry, entomology, plant inspection, and animal industry.

FORESTRY.

Forest protection and forest extension have continued to constitute the main activities of the Division of Forestry during the past fiscal year. A few minor changes in forest reserve boundaries were made during the year in order to take in additional forest land, adjust the official boundaries to establish fence lines, or throw out agricultural land of higher value than for forest purposes. By an adjustment of boundaries the area of the Lihue-Koloa Reserve on Kauai was reduced by 658 acres and the Kealia Reserve on the same island was reduced by 885 acres. One acre along the Volcano Road was added to the Olaa Forest Park Reserve and from the Olaa Forest Reserve 83 acres of agricultural land were withdrawn so that they could be leased. The total area included in the 47 forest reserves throughout the Territory now amounts to 817,114 acres or about 20 per cent of the total land area of the eight main islands in the group. Of the area in forest reserves 557,344 acres or 68 per cent is land belonging to the Territory.

Progress has been made in fencing forest boundaries, where they are exposed to the ravages of stock, but in a smaller degree, on account of the high cost of materials and scarcity of labor. During the fiscal year the construction of new wire fences was completed on 5.25 miles of forest boundaries and 1.80 miles of old fences were repaired. An additional 2.50 miles of new fence is in the process of construction, making a total of 9.57 miles receiving attention during the year. Eleven forest and grass fires have been reported during the year, a surprisingly low number in view of the very dry condition which has prevailed. Most of these were not extensive, did very little damage, and were extinguished the same day by men working under the fire wardens of the Board.

Wild stock doing damage in forest reserves, to the total number of 584 were killed or removed during the year. These comprised 309 wild goats, 46 wild cattle and 229 wild pigs.

The field force has been increased from eight to eleven forest rangers, whose chief duty it is to carry out forest protection measures by building and repairing boundary fences, but who also are at times engaged in tree planting and general administrative duties. By the arrival of an assistant to the Superintendent at the end of the year, it will now be possible to extend the scope of forest work.

The eight forest nurseries of this Division on the four main islands propagated or distributed a total of 292,081 trees during the past calendar year for general planting throughout the Territory. Large numbers of shade trees and ornamental plants and vines were supplied to the military posts on Oahu for the beautification of quarters.

Tree planting operations on forest reserves in need of reforestation for the conservation of water were extended and consisted mainly in the planting of koa trees on well drained soil. A large variety of other trees, not used before in extensive planting, were also set out in various situations to test their adaptability. In this manner 32,648 trees were planted out on the forest reserves in spite of a comparatively dry year.

Advice and assistance on tree planting and the care of trees has been rendered the public, instruction on tree planting was given at the vocational school for soldiers at Schofield Barracks and lectures on forestry were delivered at the Territorial Summer School and the College of Hawaii.

ENTOMOLOGY.

The aim of the Division of Entomology has been to meet the demand for relief from insect depredations; the work, therefore, has been almost altogether practical.

The propagation and distribution of beneficial insects, particularly the fruit fly, horn fly and corn leaf hopper parasites has been continued throughout the year. Also an attempt has been made to acclimatize and establish in the islands *Pteromalus puparum*, a pupal parasite of one of the destructive cabbage insects, *Pieris rapae* (cabbage worm, imported cabbage butterfly). A small shipment was received through the co-operation of the California State Horticultural Commission in June, 1919, and thousands of individuals have been reared and liberated.

No field work has been undertaken, on account of the unsettled conditions abroad and poor transportation facilities.

An investigation was begun early in the year of the natural control of the dungflies in Hawaii, with the purpose in mind of securing additional agents, if conditions warranted it, and so improving the control. Considerable time also has been given to the study of the termites, or white ants, which are becoming severely and alarmingly destructive with the increase and spread of two lately immigrant species. These investigations remain incomplete at the present time.

In September, 1919, an infestation of the forest ferns by the Australian fern weevil, *Syagrus fulvitaris*, was discovered at 29 miles from Hilo on the Hilo-Kau road. On account of the wealth of fern growth in this region and the importance of the ferns as part of the ground cover in the Hamakua Forest Reserve, it was decided to attempt to control the outbreak and prevent the spread of the weevil beyond the confines of the small area in which it was determined to be present. This necessitated

the destruction of all ferns in the area as far as possible, which were cut and burned; thereafter the ground cover was either fired or poisoned as far as possible to destroy crawling weevils, which might have escaped the initial treatment, and every vestige of fern plant on which the beetle could subsist; and an artificial barrier of crude oil was laid to contain the insect. At the same time an investigation was made of the weevil's history, habits, cyclical development, etc., which had not previously been done, although the weevil has been known in the islands fifteen years. This work has occupied the division almost exclusively during the remainder of the year. The routine work of advising in regard to agricultural and stock pests, maintenance of collections, etc., however, has been adequately attended to.

PLANT INSPECTION.

The work performed by the Chief Plant Inspector and his assistants during the fiscal year ending June 30, 1920, consisted of the following:

1. The inspection of all fruit, plants and vegetables shipped from Honolulu to all ports of the other islands for the purpose of preventing the spread of any pest existing on Oahu to the adjacent islands. Honolulu being the only port of entry for foreign plants and plant products, it follows that injurious insects and diseases will first become established on Oahu.

2. The inspection of all fruit, plants and vegetables coming into the Territory by mail, freight or baggage from foreign countries and the mainland of the United States, to prevent the introduction of pests and plant diseases liable to become injurious to the various agricultural industries of these islands.

During the past fiscal year there arrived at Honolulu, Hilo and Kahului, the only ports in the Territory where fruit or vegetables enter directly and at which places local inspectors are stationed, 884 vessels. Of these, 356 carried vegetable matter consisting of 254,502 packages of fruit and vegetables and 7,560 packages of plants and seeds. Of this amount, 463 packages were fumigated on account of infestation of various kinds or as a precaution; 880 packages were burned on account of infestation or being contraband; and 517 packages were returned to the original shipper as contraband and unmailable.

In addition to the regular steamers, all tramp steamers touching at Honolulu for fuel and supplies were boarded and inspected for vegetable matter. Particular attention was given to those coming via the Panama Canal and other tropical countries in order to prevent the escape of possible pests carried on plants or vegetable supplies in transit. Notices and copies of federal and territorial quarantine laws are furnished to the proper officials of these ships in order that they may be able to take the proper precautions against bringing undesirable insects and plant diseases into the Territory.

During the year a material increase was noted in the importations of fruits and vegetables. Following are some of the larger staples imported of which the Territory does not as yet supply sufficient for home consumption:

Oranges	35,403 boxes
Cabbage	1,114 crates
Onions	26,639 bags
Lemons	5,908 boxes
Celery	1,048 crates
Potatoes	83,726 bags

Several important changes have been made in the rules and regulations, also a new regulation pertaining to potato and apple shipments from the Pacific Coast ports has been promulgated. This new regulation will do much to improve the grade and quality of these commodities.

The plans for additions to the fumigation building, the roof over the yard and the fencing are ready and have been approved, so that very soon work will be started on these improvements.

We have continued the inspection of plant produce from Honolulu to ports on the other islands on the same lines as last year. During the fiscal year, 693 steamers were attended to and 48,343 packages of plants, fruits and vegetables were inspected. Of this number, 254 packages were seized and refused shipment on account of infestation or having undesirable soil attached to the roots.

Particular attention is paid to all sugar cane seed shipments from Oahu to plantations on the other islands. All these shipments go through the Experiment Station of the H. S. P. A., and no sugar cane is permitted to go by individuals unless first submitted for examination by them. In this way all risks of introducing some new pest or disease of this large industry is avoided.

ANIMAL INDUSTRY.

The control and suppression of infectious and contagious diseases among live stock and the prevention, by means of inspection and quarantine, of the introduction of such diseases with imported animals have constituted, as in previous years, the main work of this Division.

The eradication of bovine tuberculosis has been continued as in the preceding years and a marked improvement has been noted during the period under review. Starting with 31.25 per cent of disease among the dairy herds, the end of the present fiscal period shows less than 1½ per cent. By means of very liberal indemnification laws, all objection to the test on the part of cattle owners has been eliminated and our work toward total eradication greatly facilitated.

No cases of glanders or epizootic lymphangitis or hog cholera have been reported from any part of the Territory. A few small

outbreaks of hemorrhagic septicemia in swine (swine plague) have been reported from the different islands, but all have been properly checked by the use of vaccine.

No cases of anthrax have been recorded during the past year and, as semi-annual vaccination is being practised, no cases are apt to occur. It is confidently expected that in a short time the Territory can be declared free from this disease.

Contagious abortion has recently made its appearance among several herds on Oahu and in at least one herd on Maui. This is the first time it has been definitely recorded from this Territory, but has for some time been expected to make its appearance, due to the increasing number of importations of dairy cattle. The serum and vaccine treatment of exposed and affected cattle is being undertaken and good results should soon be apparent.

During the latter part of the year an extensive outbreak of bovine hemorrhagic septicemia occurred on Hawaii. The immediate administration of serum and vaccine confined the loss, which otherwise would have been extensive, to less than two hundred head.

Contagious epizootic still continues to be the bane of poultry raisers. As has been noted before, chicks should be hatched during the first four months of the year in order to escape the ravages of this disease.

Importations of live stock have slightly increased during the year. Practically all classes were represented, including some of the highest class breeding stock ever brought to this Territory.

The Territory is self-supporting as far as the production of pork is concerned. For a number of years all hogs imported from the mainland have been strictly breeding stock. Large importations of frozen beef, mutton and poultry still continue, showing that the demand is greatly in excess of the supply. The next few years should see such importations considerably reduced through the influence of such high class breeding stock as above referred to.

Division of Forestry

Honolulu, July 19, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of June, 1920:

TREE PLANTING.

In addition to the tree planting operations reported on by the Forest Nurseryman, there were set out during June at Mikilua in the Lualalei Forest Reserve, Oahu, the following trees: 1,670 Australian red cedar; 1,120 red mahogany; 360 red gum, and 127 *Acacia catechu*, or a total of 3,277 trees. The trees of the last mentioned species, a valuable tree

from India for planting in our dry regions, were from a lot of 267 transplants of large size, which were kindly turned over to us by the H. S. P. A.

FOREST FIRES.

Only one forest fire was reported during the month. This occurred in Olaa, Hawaii, on June 9, in the region from 22 to 24 Miles along the Volcano Road, in the form of a surface fire which passed rapidly over the land before a stiff breeze and covered approximately 100 acres. It was placed under control the same day by men working with Forest Ranger Mackenzie.

PERSONNEL.

The new Assistant Superintendent of Forestry, Mr. Charles J. Kraebel, arrived on June 22 from Portland, Oregon, where he had been engaged in work for the U. S. Forest Service. Considerable time was spent during the remainder of the month in acquainting him with his new duties and outlining his work for the first few weeks.

Mr. Harry L. Denison, Forest Ranger for the Kohala Mt. and Hamakua Pali Forest Reserves, Hawaii, in co-operation with the Forestry Division of the H. S. P. A. began his new duties on the first of the month.

FOREST RESERVE CHANGES.

On June 9, the forest reserve hearing to consider certain changes in five forest reserves, detailed in my May report, was held and no one appeared to present any objections to the changes. The proclamations were accordingly sent to the Governor, who signed them on June 21.

PROPOSED RULE 5.

On June 9, following the forest reserve hearing, a hearing to consider arguments for and against the adoption of proposed Rule 5 of the Division of Forestry was held, and was well attended by both those in favor of and those opposed to the rule, which proposes the forbidding of tramping on the important steep watersheds at the head of Palolo and Manoa Valleys. The grave danger of the ruination of the native forest by the spread of Hilo grass brought in and scattered along the trail by the feet of trampers was pointed out by experts and opposed to this were the arguments that the Olympus-Konahuanui trail should be kept open as a tourist asset and for the use of local recreationists. The minutes of this hearing are transmitted herewith for your information. I respectfully request that the matter be given your careful consideration and, in the interest of protecting this most important city watershed, I again strongly recommend the adoption of Rule 5 as already presented to you.

MAUI TRIP.

From June 14 to 16, I was at Wailuku, Maui, as a witness for the Territory in the case of cattle stealing, Territory of Hawaii vs. Charles E. Thompson.

HAWAII TRIP.

From June 24 to 26 I made a trip to Hilo and Kilauea in company with the President and Chief Plant Inspector, during which a number of matters were investigated and several conferences held. Plans for moving the Hilo nursery to the Animal Quarantine Station grounds and for its enlargement were discussed on the ground with Dr. Elliot and Bro. Matthias Newell, and it was decided to proceed with the work as soon as possible. To provide for expansion and secure ground for testing out trees by the establishment of an arboretum, it

was found desirable to add the adjacent 13-acre tract of land to the nursery and a request was made of the Commissioner of Public Lands to have this area set aside by Executive Order for the use by this Board for this purpose. Conferences with representatives of the Hilo Board of Trade and County Supervisors brought forth opinions in favor of this plan. A possible new site for a plant fumigation building near Kuhio wharf was examined. Personal instructions were given to Ranger Harry L. Denison concerning his new forest work in the Kohala mountains. An examination of the area at 29 Miles treated for the fern weevil disclosed the presence of a very few weevils in the center of the infection, but none on the borders. These few were found on young *sadleria* fern sprouts and were at once destroyed. Ranger Mackenzie was instructed to watch out for these and to destroy all young fern sprouts as soon as discovered. A long conference was held with Ranger Mackenzie on the work in his district and the details for the reconstruction of the ranger cabin on the Koa Grove lot at 29 Miles were discussed. With the Land Commissioner I also went over the boundary of a proposed addition to the National Park near the Volcano House, at the request of the Park authorities.

Several trips were made during the month to the Pupukea Forest Reserve on Oahu with a Government surveyor to determine the location of certain boundary borders preparatory to setting up permanent monuments and starting co-operative tree planting.

Work was started on the thinning out of several ironwood trees on the road in Nuuanu leading to the Pali. These were crowding out other more desirable trees, and on account of their size were in danger of falling and becoming a menace to traffic.

The last few days of the month were spent partly in preparation for the July trip to Kauai, which was planned for the purpose of investigating several forest matters, and starting the Kokee Campers in properly.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, July 21, 1920.

Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit a report of the principal work done during the month of June, 1920:

NURSERY.

Distribution of Plants—

Sold	120	pot grown plants
Gratis	662	pot grown plants
Total	782	pot grown plants

COLLECTIONS.

Government Realizations.

Collections on account of plants sold.....	\$ 3.15
Collections at sub-nursery, Kauai	15.00
Rent of Office Building, Nursery Grounds for May.....	35.00
Total	\$53.15

PRESERVATION FOREST RESERVES.

Rents and Fees.

Rent of Premises at Half-Way House, Tantalus, for quarter ending June 30th, \$10.00 per month	\$ 30.00
Fee for use of land and gathering ti leaves on Kalawahini, Pauoa Valley, for quarter ending June 30th, \$12.50 per quarter	12.50

Na Pali Kona Forest Reserve.

Fee for campsites Nos. 48 and 49, to Dec. 31, 1920— L. D. Larsen	\$ 3.50
Fee for campsites Nos. 16 and 17, to Dec. 31, 1920— Zella M. Breckenridge	\$ 11.00

Black Sand from Makiki Sand Pit.

124 loads of black sand at \$0.50 per load.....	\$ 62.00
	<hr/> \$119.00

SEED COLLECTING.

The seeding season for a large number of trees in and around the city is now on, and the two boys are kept busy collecting and sorting. The koa trees on Tantalus are also seeding freely this year, and we expect to be able to collect a number of pounds of this seed before the insects have time to destroy it.

MAKIKI STATION.

The work done at this station has been principally routine. We are getting ready a large assortment of plants for the coming planting season.

HONOLULU WATERSHED PLANTING.

Trees planted amounted to 350 Australian Red Cedar (*Cedrela Australis*) on land around the pond site adjoining the Waterhouse property.

HILO SUB-NURSERY.

Brother M. Newell in his report for June gives the number of trees distributed at 236 in transplant boxes.

Joe Rita, Jr., reports the distribution of 830 trees in tin cans.

The report from Maui sub-nursery has not arrived.

ADVICE AND ASSISTANCE.

The writer made the following number of calls and otherwise gave advice and assistance, at the request of people in and around the city:

Calls made	8
Advice by telephone	5
Advice to people calling	10

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

Division of Entomology

Honolulu, July 24, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—During the month of June, the insectary handled 14,300 pupae of the melon fly, from which there were bred 2,271 females and 1,728 males, *Opius fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

<i>Opius fletcheri</i> .		Female.	Male.
Oahu:			
	Kaimuki	75	75
	Kailua	1,100	1,050
Kauai:			
	Kealia	250	200

FRUIT FLY PARASITES.

<i>Diachasma tryoni</i> .			
Oahu:			
	Kaimuki	230	200
	Anapuni Street	100	100
	Nuuanu Avenue	100	100
Maui:			
	Kula	100	100

<i>Diachasma fullawayi</i> .			
Oahu:			
	Nuuanu	60	60
	Kaimuki	100	100
Maui:			
	Kula	80	80

<i>Dirhinus giffardi</i> .			
Oahu:			
	Anapuni Street	100	
	Nuuanu Avenue	400	

<i>Opius humilis</i> .			
Oahu:			
	Nuuanu	100	

<i>Galesus silvestri</i> .			
Oahu:			
	Nuuanu	500	

<i>Tetrastichus giffardianus</i> .			
Oahu:			
	Nuuanu	500	
Maui:			
	Kula	400	

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

Division of Plant Inspection

Honolulu, June 30, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of June, 1920, as follows:

During the month 76 vessels arrived at the Port of Honolulu, 24 of which carried vegetable matter and 10 vessels came through the Panama Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	1,063 lots	14,357 packages
Fumigated	16 “	17 “
Burned	91 “	194 “
Returned	7 “	7 “
Total Inspected.....	1,177 “	14,845 “

Of these shipments 14,153 packages arrived as freight, 155 packages as mail and 177 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 31,095 bags of rice from Japan, 420 mats of rice from China and 3,512 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 4,908 pieces of baggage belonging to immigrants from foreign countries were examined, from which 41 lots of fruit and 24 lots of vegetables were seized and destroyed.

On June 15, two packages of plants came by express from California and being infested with Aphis were fumigated.

On June 16, 9 lots of plants, one lot rice paddy, and one lot of corn, found in the baggage of immigrants from the Orient were seized and destroyed. One package of seeds, also belonging to an immigrant was seized and destroyed on account of weevil indications. A package of pili nuts in the mail from Manila was fumigated on account of ants. A package of seeds from Java for Dr. Lyon was fumigated precautionarily. Three packages of seed, a package of taro, a lot of grass plants and a package of beans, all from Japan, as well as a package of Betel nuts from Manila and a package of seeds from China, were fumigated precautionary.

On June 20, a lot of mangosteens in possession of one of the crew on the Santa Cruz from China, for a party in Honolulu, were refused entry and ordered kept on the steamer.

On June 21, per Makura, Mr. Fred Muir returned with two cages containing soil and sugar cane plants on which he imported parasites for the cane leaf hopper. These cages were opened at the H. S. P. A. Experiment Station in my presence in their quarantine room, and later all soil and cages were fumigated, and I then brought them to my department and the soil, packing and cane plants were destroyed by burning.

On June 22, per Matsonia, four boxes of peaches were burned, being infested with peach worm. Notice was sent to the shipper regarding future shipments.

On June 22 per Nanking, in the baggage, a plant and a package of taro were seized and destroyed. A lot of peas also in the immigrant baggage was burned on account of weevils.

On June 23, per Colusa, two packages of potato seed from France, were seized and destroyed, being prohibited.

On June 23, per Siberia Mail, a package of bulbs in the baggage of an immigrant and seven lots of plants belonging to passengers were seized and destroyed. A lot of Betel nuts from Manila were fumigated precautionary.

On June 29, per Manoa, 20 boxes of peaches were destroyed on account of peach worm.

On June 30, per Sonoma, two packages of grass seed in the mail from Sydney were fumigated precautionary.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of six steamers at the Port of Hilo. Four carried vegetable matter consisting of 239 lots and 1,945 parcels, all clean with the exception of one lot of turnips, which were wormy. These were destroyed.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of seven vessels at the Port of Kahului. Two carried vegetable matter consisting of 14 lots and 534 parcels, all clean.

INTER-ISLAND INSPECTION.

Fifty-six steamers plying between Honolulu and the other Island ports were attended, and the following shipments passed as free from pests:

Taro	583 bags
Vegetables	390 pkgs
Fruit	342 pkgs
Sugar Cane	21 cases
Plants	105 pkgs
Seeds	3 pkgs
<hr/>	
Total	1444 pkgs

Fifty-one packages of plants (which includes Spanish Moss on leis) were refused shipment on account of infestation, undesirable soil, and not complying with the regulations.

During the month I visited Hilo in company with the President and Executive Officer of the Board to look into the matter of erecting a fumigating plant at Hilo. This matter will be taken up later on after a certain location has been secured. I also visited Maui at the request of the President of the Board, and went over the work of the local Inspector at Kahului. Everything is being done to protect the Island from infested fruit and plants from the Mainland. During my brief stay I made a search for the fern weevil and inquired from many if any damage to house ferns had been noticed. Nothing has been noticed nor reported, and I did not find any indications as far as I went. However, I believe that further search should be made in the very near future, not only on Maui, but on the other Islands.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

Division of Animal Industry

Honolulu, July 20, 1920.

Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I have the honor to submit the following report for the month of June:

TUBERCULOSIS CONTROL.

From the appended report of the Assistant Territorial Veterinarian, it will be noticed that 20 head of cattle were condemned out of a total of 161 tested. The entire number of condemned cattle came from the Wailupe ranch.

In the round-up for injections a total of 157 animals were brought in. Of this number 52 were injected for the first time as determined by absence of tags or ear perforations.

While it cannot be said that the entire 52 head were not present at the time of the first test in November, 1919, it is certain that at least 10 head were of testable age, six months or over, at that time and would have been tested had the round-up been complete.

At this second test at the round-up for examination 147 out of the original 157 were brought in as determined by actual count, leaving a balance of 10 injected animals still in the valleys. Considering the number condemned out of what were brought in at the second round-up it is practically certain that one or more animals in this 10 head showed a reacting to the test, and were left on the premises to continue as a known source of infection to the balance of the herd.

Post-mortem examination of the condemned cattle showed three cases of generalized tuberculosis of the most virulent type, necessitating the condemnation of the entire carcass. Cases of this nature rapidly disseminate the disease among a herd even when they do not come in close contact as with stabled animals. Hence the great importance of making the round-ups as complete as possible, and the holding of all injected animals until the examination is over.

These conditions may be remedied somewhat when the new regulations are put in force. However, a more complete spirit of co-operation on the part of the owner is of more direct benefit and assistance to the work in hand than letters of law.

SWINE PLAGUE.

A small outbreak of this disease occurred among hogs at Kuliouou. Prompt administration of vaccine checked the disease entirely and confined the loss to three head.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, July 10, 1920.

Dr. V. A. Norgaard, Chief, Division of Animal Industry, Bureau of Agriculture and Forestry, Honolulu.

Sir:—I beg to submit the following routine report for the month of June, 1920:

TUBERCULOSIS CONTROL.

The following cattle were tested during the past month:

	Tested.	Passed.	Condemned.
Francis Gay	1	1	0
A. Perry	157	137	20
Waialae Ranch	3	3	0

A total of 161 cattle were tested, out of which number 141 were passed and 20 condemned and branded.

Twenty nine condemned and branded cattle were autopsied at local abattoirs. Positive lesions of tuberculosis were found in each case.

LIVE STOCK IMPORTATIONS.

During the month 44 vessels were boarded by the inspector, and the following found to carry livestock for this Territory:

- S. S. Manoa, San Francisco: 17 crates poultry.
- S. S. Hyades, San Francisco: 3 crates poultry.
- S. S. Maui, San Francisco: 1 crate cats, E. H. Magoon; 1 crate poultry.
- S. S. Venezuela, Orient: 3 chow dogs, W. A. Ramsey; 1 Boston Bull Ter., E. Fernandez.
- S. S. Seiyo Maru, Orient: 1 crate poultry.
- S. S. Korea Maru, San Francisco: 1 dog, Mrs. R. P. Spaulding.
- S. S. Wilhelmina, San Francisco: 1 Boston Bull Ter., L. A. Whitney; 2 white collies; 2 crates poultry. Amer. Ry. Ex. Co.
- S. S. Wilhelmina, San Francisco: 10 crates poultry.
- S. S. Tenyo Maru, Orient: 1 Airedale, J. H. Baker; 2 chow dogs, A. E. Evans; 1 crate poultry.
- S. S. Lurline, San Francisco: 12 mules, City Mill Co.; 52 mules, F. H. Locey; 20 mules, American Factors; 23 horses, F. H. Locey; 8 horses, Haw. Dredging Co.; 1 horse, L. D. Warren; 3 Berkshire Sows, Kam. School; 36 crates poultry.
- S. S. Siberia Maru, Orient: 3 crates poultry; 1 crate Parrots.
- Sch. Puako, Africa: 1 English Bull Dog, James Rolph.
- S. S. Dellwood, San Francisco: 1 Fox Terrier, Wm. Skelton.
- S. S. Sonoma, Sidney: 1 Airedale pup, Mr. McWayne.
- S. S. Manoa, San Francisco: 22 crates poultry.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

By Authority

TERRITORY OF HAWAII BOARD OF AGRICULTURE AND FORESTRY. DIVISION OF ANIMAL INDUSTRY.

REGULATIONS GOVERNING THE APPRAISEMENT OF TUBERCULOUS CATTLE AND EXPENDITURES ON ACCOUNT OF THE CONTROL AND ERADICATION OF BOVINE TUBERCULOSIS.

Under authority conferred by law upon the Board of Commissioners of Agriculture and Forestry, the following regulations are hereby promulgated to supplement and define the provisions of Act 204 of the 1919 Session Laws governing the slaughter of animals and expenditures on account of the control and eradication of bovine tuberculosis, which for the purposes of identification shall be known as D. A. I. Order No. 1.

REGULATION I.—DEFINITIONS.

For the purposes of these regulations the following words, names and terms shall be construed, respectfully, to mean:

Sec. 1. Animals	Cattle.
Sec. 2. Disease	Bovine tuberculosis.
Sec. 3. The Board	Board of Commissioners of Agriculture & Forestry.
Sec. 4. Officer of the Board.....	Territorial Veterinarian.
Sec. 5. Territorial Veterinarian..	Refers to and includes the Assistant Territorial Veterinarian and the Deputy Territorial Veterinarians stationed on other islands.
Sec. 6. Reactor	An animal proven by the tuberculin test to be affected with tuberculosis.
Sec. 7. Co-operation	Compliance on the part of the owner with all rules and regulations issued by the Board pursuant to the control and eradication of bovine tuberculosis.

REGULATION II.—APPLICATION OF TUBERCULIN TEST.

Sec. 1. All dairy cattle within this Territory more than six months old, and all cattle suspected of being affected with tuberculosis, shall be tuberculin tested by the Territorial Veterinarian.

Sec. 2. All cattle so tested shall be ear marked with a registered design at the time of injection and the reactors branded as by law prescribed.

REGULATION III.—OWNER'S CO-OPERATION.

Sec. 1. The owner shall co-operate with the Territorial Veterinarian by facilitating his access to the cattle to be tested. He shall provide stanchions, chutes and holding pens, attend to the confinement of the cattle therein at such time, and in such manner as required by the Territorial Veterinarian, and shall supply whatever assistance the Territorial Veterinarian may deem necessary for the safe and effective application of the test.

Sec. 2. The owner shall further co-operate in carrying out the purposes of this law, by keeping his premises in a clean and sanitary condition. By this is meant that stables, sheds and enclosures be kept as by the Sanitary Code of the Territory required. Paddocks and pastures shall be rendered sanitary by the removal of all tuberculous animals (reactors) and of all other animals which have not by the tuberculin test been proved to be free from the disease.

Sec. 3. The owner shall immediately segregate and subsequently deliver for slaughter all reactors at such time and place as may be designated by the Territorial Veterinarian.

REGULATION IV.—APPRAISALS AND CLAIMS.

Sec. 1. The appraisal of condemned animals (reactors) shall be in accordance with Sec. 2 of Act 204, S. L. 1919.

Sec. 2. When so required by this Board and for the purpose of co-operating with the Federal Bureau of Animal Industry, the appraisals shall be reported on forms furnished by the said Bureau (T. E. Form 23 Revised) in triplicate. Such reports of appraisals shall show the number of animals, the value of each per head and shall be signed by the owner, and the appraiser or appraisers, and approved by the Ter-

territorial Veterinarian. These reports shall further show the amount paid or to be paid by the Territory for said animals, and shall be signed by the President of the Board of Agriculture and Forestry. The claimant shall further certify that the appraisal is accepted by him and that the amounts due him from the United States and the Territory are correct. One copy of these reports shall be submitted to the Federal Bureau of Animal Industry, one copy to the Territorial auditor, and one copy retained by the Territorial Veterinarian.

Sec. 3. When co-operating with the federal Bureau of Animal Industry, reports of appraisal and claims for indemnification shall be made on forms furnished by this Board and in accordance with Sec. 4 of Act 204, S. L. 1919.

REGULATION V.—DISPOSAL OF CONDEMNED ANIMALS.

Sec. 1. All condemned animals shall be segregated and slaughtered within thirty (30) days after appraisal, except in certain cases where, in the opinion of the Territorial Veterinarian, an extension of time should be allowed. The slaughter and inspection shall be under the direct supervision of the Territorial Veterinarian and in accordance with the meat inspection regulations of the federal Bureau of Animal Industry.

Sec. 2. After slaughter and inspection, the owner shall see that the carcass, or such parts thereof which are found to be wholesome, is sold at the best price obtainable for that class of meat and shall obtain from the purchaser a certificate, made out on forms furnished for the purpose, stating the dressed weight, price per pound and the total amount of money paid for the carcass.

Sec. 3. When co-operating with the Federal Bureau of Animal Industry a report of the salvage derived from the sale of condemned animals shall be made on the T. E. Form 24, furnished by said bureau, and signed by the purchaser or his agent. One copy of this report shall be submitted to the United States Bureau of Animal Industry with the claim and one copy retained by the Territorial Veterinarian.

REGULATION VI.—INDEMNIFICATION.

Sec. 1. The amount of indemnification shall be based upon the results of the post-mortem inspection and shall be in accordance with the provisions of Sec. 4 of Act 204 of the 1919 Session Laws.

Sec. 2. When co-operating with the United States Bureau of Animal Industry the federal share of the indemnification shall be compounded on the full appraised value of the condemned animals without deducting twenty or fifty per cent as by Act 204, 1919 Session Laws, Sec. 4, paragraphs b and c required.

REGULATION VII.—DISINFECTION.

Sec. 1. Whenever necessary, in order to prevent the spread of tuberculosis, materials contaminated by, or exposed to the disease, including barns, stables, sheds, pens, barn-yards, and other enclosures where diseased cattle have been kept, also cars and other conveyances, shall be disinfected under the supervision of the Territorial Veterinarian.

Sec. 2. All expense connected with such disinfection shall be borne by the owner.

REGULATION VIII.—CLAIMS NOT ALLOWED.

Sec. 1. No payment shall be made for any animals destroyed on account of tuberculosis unless such claim be executed upon vouchers, approved by the President of the Board of Agriculture and Forestry and supported by the forms required by these regulations.

Sec. 2. No claim shall be allowed arising out of the condemna-

tion of cattle on a tuberculin test applied by other than an officer of the Board or of the federal Bureau of Animal Industry, of improving the dairy and beef breeds of cattle in the Territory of Hawaii, encouraging recognition of the importance of maintaining such herds free from tuberculosis, and promoting the interchange of healthy pure-bred cattle, agree, so far as available funds permit, to co-operate in assisting breeders of such cattle to eradicate tuberculosis from their herds and to maintain officially Tuberculosis-free Accredited Herds.

Sec. 2. Co-operation with the Federal Bureau of Animal Industry shall be in strict accordance with their regulations on the subject.

These regulations shall become effective upon approval by the Governor.

Approved this 6th day of July, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, Hawaii.

J. M. DOWSETT

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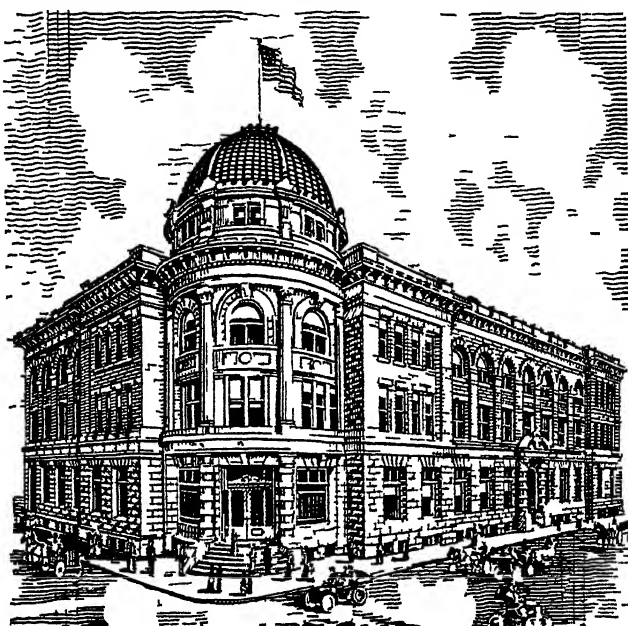
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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEEDLINGS FOR SALE AT GOVERNMENT NURSERIES.

The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papapaholahola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

HILO, HAWAII. Nursery at the Boys' Catholic School in charge of Bro. Matthias Newell, Hilo.

PRICES: Plants in seed boxes \$1.00 per 1000. Transplants in boxes 1c each. Transplants in pots 2½c each.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left-hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

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The Board of Commissioners issues for general distribution to persons in the Territory, annual reports, bulletins, circulars, copies of its rules and regulations, and other occasional papers, which may be had, free, upon application.

A complete list of the publications of the Board available for distribution (together with the titles of certain issues now out of print) is to be found on the cover of the last biennial report.

Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

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HONOLULU, SEPTEMBER, 1920.

No. 9

The Pan-Pacific Scientific Conference, which met in Honolulu from August 2 to 20, will without doubt go down in history as one of the most remarkable scientific gatherings ever held. The delegates to this Conference were, many of them, the foremost authorities in their various fields, and the discussions were marked by unusual directness and vision. It is often hard for laymen to see any "practical value" in much of the research that is being done in the natural sciences. The reason for this is because the results of such research are often subtle and indirect, and by the time they are applied in the economic structure of life their source is no longer recognized. With the recent Conference, however, no such complaint can be lodged, for the problems, which were most carefully outlined and most seriously discussed, were of immediate economic interest, and many of them apply directly, if not exclusively, to Hawaii.

At the conclusion of the First Pan-Pacific Scientific Conference, one has the feeling that many competent men are at work upon the riddles of the Pacific, and that as a direct result of the Conference there has been so clear a statement and classification of problems and so close a cooperation established among the widely-separated workers that the answer to many vital questions has been hastened by at least a quarter century.

The Territorial Veterinarian is now experimenting with the vaccination of dogs for rabies. The treatment consists of six hypodermic injections of a vaccine named after the Hungarian scientist, Dr. Hoegies. These injections are given on six consecutive days, after which the dogs must be kept under observation at the quarantine station for one month. The treatment will consequently reduce the dog quarantine from four months to six weeks, more or less.

It is desired to bring to the attention of bee-keepers and others the provisions of Rule 4 of the Board pertaining to the importation of queen bees, which it has been decided to enforce strictly henceforth. Facilities have been provided at the Government Nursery for quarantining such importations, but as it is not possible to handle large numbers of queens at one time in the most satisfactory manner, the number imported at any one time should be limited, and the notice of intention to import

should be given, without fail, so that arrangements can be made to care for them. The period of quarantine will be about one month, or sufficiently long to permit brood to be formed and inspected.

Mr. Daniel Langford, who has been employed in the Division of Plant Inspection of this Board for the past eleven years, has resigned his position to accept a more lucrative one in the Orient. We extend to Mr. Langford our best wishes for success in his new work.

A supply of the U. S. Department of Agriculture Yearbook for 1919 has been received by this Board from Representative Kalaniana'ole and copies may be obtained by addressing The Librarian, P. O. Box 207, Honolulu, or by calling at the Government Nursery, King Street.

The first installment of an article on "The Protection of Live Stock in Hawaii Against Infectious and Contagious Diseases," by the Territorial Veterinarian, is contained in this issue.

THE PROTECTION OF LIVE STOCK IN HAWAII AGAINST INFECTIOUS AND CONTAGIOUS DISEASES—(1).

By VICTOR A. NORGAARD, *Territorial Veterinarian.*

The 1919 Territorial Legislature passed an act to provide a revolving fund for the Board of Agriculture and Forestry to supply preventive and curative serum, vaccine, bacterin and other remedies for the control and suppression of transmissible diseases among the live stock and other animals in the Territory of Hawaii.

The act appropriated the sum of \$5000.00 to be known as the "Animal Industry Revolving Fund," and provided that the Board shall purchase supplies of the above-mentioned remedies and shall upon recommendation of the Territorial Veterinarian furnish these remedies to owners of diseased or exposed live stock at actual cost, the proceeds of such sales to be returned by the treasurer of the Territory to the said revolving fund.

The purpose of the act was therefore primarily to obviate the distance between Hawaii and the mainland, or, rather, the base of supply of such remedies, and to enable the Territorial Veterinarian to take immediate action in any sudden outbreak of disease, without having first to cable and then await the arrival of such remedies, the epidemic meanwhile gaining in both morbidity and mortality; and as a majority of these remedies deteriorate or lose their effectiveness with age they could not be carried in stock advantageously by dealers or druggists except at greatly advanced prices.

In order that stock raisers and breeders, as well as veterinarians, may be in a position to take advantage of the provisions of this act, it is necessary that they should know the kind and nature of the remedies which the Board keeps on hand, and should be more or less familiar with the general manifestations or symptoms of the diseases to which these remedies may be applied. As the act provides that the remedies "shall be administered by the territorial veterinarian, his assistant or deputies," it will in all cases be necessary for stock owners to have their diagnosis confirmed by one of these officers, who will then take immediate action in securing and applying the required remedy.

The Board now keeps in stock supplies of the following biological products:

Anthrax. This disease, which affects practically all domestic animals as well as man, became prevalent on Kauai, Oahu and Maui at the time of the entry of the United States into the world war, and was undoubtedly introduced here by alien enemies.

The aim must have been the destruction of the Territory's abundant meat supply, and this end might have been attained to a greater degree than occurred had it not been for the success of the scientists of the federal Bureau of Animal Industry in perfecting a new anti-anthrax serum vaccine treatment shortly before. When the outbreaks occurred this new treatment had just become available commercially and proved so efficacious that the disease was speedily suppressed and with insignificant losses after its application.

Since that time only a very few cases have occurred in Kauai, where the first infection took place, and none on either Oahu or Maui. There is, therefore, little cause for going into detail regarding this disease. It had never occurred here before, and probably never will again, as most of the country where the infection was planted is unsuited for its propagation. Vaccination is, nevertheless, practiced once a year of all live stock on the ranch where the original outbreak took place, and the Board keeps on hand a stock of both serum and vaccine sufficient to meet any emergency, however remote it may be.

Cattlemen and stock raisers should bear in mind that any sudden death of either horses, mules, cattle or sheep where the carcass shows bloody discharge from the natural openings is suspicious of anthrax and should be reported without delay to the nearest veterinarian. Incision of the carcass should be avoided until his arrival. If on post-mortem examination the blood is found to be almost black and tarry and does not clot (coagulate) and turn bright red when exposed to the air, and when at the same time the spleen is found to be enlarged, there is every reason to suspect anthrax.

Anthrax vaccine (double), requiring two injections of 1 cc. each with an interval of ten days, after which immunity may be expected to occur a week or ten days after the second injection.

costs ten to fifteen cents per double dose. It has no curative properties and will hasten the appearance of the disease in an infected animal.

It is therefore of importance when this method of immunization is employed that vaccination of all exposed live stock be finished well ahead (two to three weeks) of the setting in of warm weather—the time when deaths begin to occur—or, as it is called in infected localities, the anthrax season. It should not be used after the animals have actually begun dying from anthrax.

Anti-anthrax serum vaccine, known as “the simultaneous method,” consists in the injection of 10 cc. of anti-anthrax serum on one side and 1 cc. of a strong anthrax vaccine on the other side of the animal. The serum, which is obtained from horses hyperimmunized through repeated and increasing doses of anthrax virus, has strong preventive and curative properties and renders negligible the danger of causing anthrax with the stronger vaccine injected at the same time. It therefore confers immediate protection, and the two together establish what is known as an active immunity against the disease.

The anti-anthrax serum, owing to the fact that it requires for its production sound live horses which must be kept under treatment for months at the time—and some of the larger manufacturers keep on hand hundreds of horses in porcelain-lined, steam-heated, hygienic and sanitary stables for this purpose only—and to the further fact that for preventive purposes the serum must be given in doses ten times as great as the vaccine, and for curative purposes in doses of 100 cc. or more, it is easily understood, is a more expensive product than the vaccine, which is made in the bacteriological laboratory by inoculating flasks containing the proper culture media, such as bouillon, and after the anthrax bacteria have attained the requisite growth, attenuate (weaken) them by heat, standardize them as to strength, add a preservative, bottle, label and market.

Hence the vaccine, as stated, costs 10 cents per dose, even the double vaccine, while the simultaneous treatment—1 cc. vaccine and 10 cc. serum—costs from 30 cents to 35 cents per dose, and a curative treatment of serum alone (100 cc.) costs \$2.50 to \$3.00.

(To be continued.)

DIVISION OF FORESTRY.

REPORT OF THE SUPERINTENDENT OF FORESTRY, JULY, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of July, 1920:

KAUAI TRIP.

From July 2 to 24, I was on the Island of Kauai making a general inspection of forest matters and spent considerable time in the region of the Kokee Camps to make sure that the campers were properly informed and complied with the sanitary requirements. At the time of my visit there were about 75 campers in the Kokee region enjoying the cooler climate to be found there. With the Chief Sanitary Inspector of the Board of Health I made inspections of all the camps and, with the exception of two, all were found to be in good sanitary condition and certificates to this effect were issued by the Inspector. In the two camps mentioned, garbage holes had to be dug and in one a toilet had to be further removed. These matters were being attended to when I left.

One day was spent with the special committee, appointed by the Kauai Board of Supervisors, which has charge of the management of the Puu Ka Pele Park, in going over the park area, selecting sites for community house, camp sites, etc., and assisting in plans for the development of the park. Water is being laid on to the park area by the construction of a pipe line which will lead the water from Halemanu Stream along the edge of the Waimea Canyon, going through the canyon rim in a tunnel now being constructed. The project will be in readiness for the next camping season.

New trails to make the canyon views more accessible were located and will be built by private parties.

It will be of general interest to note that the rainbow trout planted last spring in the Kokee Stream by the Fish and Game Commission are thriving and have attained a length of almost two inches.

On account of the removal of all wild cattle from the Halemanu and Kokee region, the undergrowth and young trees are coming up thickly over a large part of the forest and the forest in general is coming back to normal in a satisfactory manner. The goats, while still numerous on the canyon cliffs, are not encroaching upon the forest areas and are being held in check by the hunters.

An inspection was made of the nursery at Kalaheo in charge of Joe Rita, and it was found to be in a satisfactory condition. Over 3000 transplants were on hand ready to be set out and about 10,000 seedlings coming up. This nursery is able to supply the local demand for trees, and the output could be increased without added expense.

HILO NURSERY.

Work was begun on the establishment of a new nursery in Hilo on the land adjacent to the Animal Quarantine Station in accordance with plans made by the Forest Nurseryman and approved by the President and myself. A pipe line 1500 feet long is being laid down, lumber for a potting shed and office has been ordered, and an extra laborer has been put on the work. The purpose of this expansion is to make a much larger number of trees available for distribution on Hawaii.

MISCELLANEOUS.

A Ford machine has been ordered for Ranger Lindsay so as to aid him in his work of tree distribution and inspection of forest reserves on the Island of Maui.

Tree planting has continued during the month on Tantalus and at Mikilua, in the Lualualei Forest Reserve, Oahu.

The Assistant Superintendent has been engaged during the month in completing the location and monumenting of corners on the makai boundary of the Pupukea Reserve, Oahu, and in surveying out areas in

pineapple cultivation as a basis for cooperative tree planting to be begun this fall.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

**REPORT OF THE ASSISTANT SUPERINTENDENT OF FORESTRY,
AUGUST, 1920.**

Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—I respectfully submit the following statement of my activities during the month of August:

During the first two weeks of the month considerable time was spent attending meetings of the Pan-Pacific Scientific Conference, particularly the meetings of the botany section. The discussions at these meetings were peculiarly valuable in bringing out original evidence of the relationships and derivation of the Hawaiian flora.

Some assistance was given the committee in transporting delegates to various places in the official car.

In company with Mr. Haughs, the submarine base at Pearl Harbor was visited for the purpose of discussing with the officers in charge the possibilities of improving the five-acre tract of the station by means of ornamental planting.

A trip was made over the Olympus-Konahuanui trail to observe the spread of Hilo grass in the forest of the Honolulu Watershed. Photographs were taken of one of the many places where the grass is in complete possession of the ground.

Several days were spent at Manoa Ranger Station, examining the plantations of introduced species set out in 1916-1917. Of over 105 species planted, more than 75% are quite successful, among the most promising being several eucalypts and the Philippine Molave (*Albizia parviflora*).

A tracing and blueprints were made from the base maps originally constructed by Mr. Judd in order to facilitate examination of the plantations and plans for their further development.

Work was begun on the preparation of tables showing the ownership and acreage of all private lands within the boundaries of the forest reserves.

A trip was made to Kolekole Pass, in the Waianae Mountains, where photographs were taken to show the progress of the planting on the slopes of Puu Kailio just below the pass.

Throughout the month considerable time was spent in studying the forestry files, publications of the Division of Forestry, and various periodicals and books in the Bureau library, for the purpose of becoming thoroughly familiar with the work of the Division.

Respectfully submitted,

CHAS. J. KRAEBEL,
Asst. Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN, JULY, 1920.

Superintendent of Forestry, Honolulu, Hawaii.

Sir:—The following report gives the principal work done during the month of July, 1920:

DISTRIBUTION OF PLANTS.

The number of plants distributed during the month amounted to 2517, including 620 sent to government forest reserves.

COLLECTIONS—GOVERNMENT REALIZATIONS.

On account of sale of plants.....	\$ 1.65
Rent of office, nursery grounds, for June.....	35.00
Total	<u>\$36.65</u>

SEED COLLECTING.

The collecting of seed is progressing. We have collected on Tantalus 55 pounds of clean koa seed, which is the largest amount on record for one season. We expect to have enough koa seed now to last us for several years. The assistance of the gang working on the watershed had to be secured for four days in collecting this seed. We are also collecting seed of Eucalyptus, Casuarina, Grevillea and the shade and ornamental trees.

MAKIKI STATION.

The work done at this station, in addition to the regular routine, consisted of cutting up wood for boxes, making lattice, etc.

HONOLULU WATERSHED PLANTING.

We have just finished planting around where the small pond used to be, adjoining the Waterhouse property. The slopes around the pond site have been planted with Australian red cedar (*Cedrela Australis*), 350 being planted in June and 485 in July, total 835. At the request of the property owners in the neighborhood, the pond part has been left undisturbed, the object being to try to make the pond hold water, so that it may, as in former years, add to the beauty of the surroundings. The vacant spaces in the watershed are gradually being covered with trees. A considerable area at the top of Makiki Main Valley still remains to be planted. The planting up of this part is very important, as the springs that supply the Makiki reservoir are located there. A dense forest around the spring heads, there is no doubt, might be the means of preserving and increasing the supply of water.

Another matter that should be considered at this time is fire protection. Many miles of trails have been made through the forest back of Honolulu for this very purpose. As the dry season is on, our trails should all be kept clear and put in good shape for the protection of the forest. A forest fire of a few hours' duration is liable to destroy the work of several years in tree planting.

SUB-NURSERIES.

Hilo. Bro. M. Newell, in his report for the month, states that he distributed 717 plants in transplant boxes.

Maui. Mr. James Lindsay states that he distributed 339 assorted plants during the month.

Kauai. The report of this nursery has not yet been received.

ADVICE AND ASSISTANCE.

In company with President Atkinson and Mr. Ehrhorn, a trip was made to Maui, the object of my visit being principally to look over the work done at our sub-nursery at Haiku. I found the nursery in good shape, with lots of young plants started for the coming planting season.

While on Maui we visited the nursery of the Wailuku Plantation Company and were shown by Mr. Penhallow the immense amount of work in tree planting that the company has done during the past eight or nine years.

A trip was also made to Hilo for the purpose of locating and deciding upon a new nursery at the Animal Quarantine Station. The location of

buildings and nursery has been arranged, and work will start at once in laying water pipes and erecting buildings, etc.

The writer has made ten visits, including one to the naval submarine and aviation base at Pearl Harbor and one to the arsenal at Fort Shafter, the balance being made at the request of people in and around the city.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

REPORT OF THE FOREST NURSEYMAN, AUGUST, 1920.

Superintendent of Forestry, Honolulu, Hawaii.

Dear Sir:—I herewith submit a report for the month of August, 1920:

NURSERY.—DISTRIBUTION OF PLANTS.

Sold, pot-grown plants	153
Gratis, pot-grown plants	1637
Total number pot-grown plants.....	1790

COLLECTIONS.—GOVERNMENT REALIZATIONS.

Collections on account of plants sold.....	\$ 3.75
Rent of office, Nursery grounds	35.00
Sale of plants at Kalaheo Nursery, Kauai	20.00
Total.....	\$ 58.75

PRESERVATION, ETC., OF FOREST RESERVES.

Parker Ranch, rent of 73 acres of land in Hilo Forest Reserve near Keanokolu, August 12, 1919-August 12, 1920.....	\$ 39.50
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ANIMAL INDUSTRY REVOLVING FUND.

Abbie E. Macomber, 73 doses hemorrhagic septicemia vaccine at 11c	\$ 8.03
Mrs. Anna H. McCarthy, hemorrhagic serum	5.91
Hutchinson Sugar Plantation Co. and Waiohinu Agricultural & Grazing Co., 4934 doses hemorrhagic septicemia vaccine.....	542.74
14 bottles hemorrhagic septicemia at \$2.50.....	45.00
Total.....	\$604.68

MAKIKI STATION.

The work done at this station has been principally routine, consisting of mixing and sterilizing soil, transplanting seedlings into pots and boxes, etc.

HONOLULU WATERSHED PLANTING.

The work done on the watershed consisted of the planting of 217 koa trees on land adjoining the Schmidt Estate, clearing off, etc.

SUB-NURSERIES.

Haiku, Mani. Mr. James Lindsay reports the distribution, during the month of August, of the following number of trees:

In seed boxes	300
In transplant boxes	715
Total.....	1015

Kalahoe, Kauai. Mr. Joe Rita, Jr., reports that he distributed the following:

July	647	pot-grown trees
August	389	pot-grown trees

LUALUALEI, WAIANAE.

J. K. Luka reports the planting of trees for August as follows:

Ficus (five species)	200
Eucalyptus resinifera	2095
Australian red cedar	1340
Total.....	3635

ADVICE AND ASSISTANCE.

The writer has, at the request of people in and around the city, made calls and otherwise given advice and assistance as follows:

Calls made	6
Advice to people calling	4
Advice by phone	6

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

REPORT OF THE ENTOMOLOGIST, JULY, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—During the month of July the insectary handled 16,200 pupae of the melon fly, from which there were bred 2333 females and 2050 males, *Opisus fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

	<i>Opisus fletcheri</i> .	Females.	Males.
Oahu:			
Moiliili	350	300	
Moanalua	200	200	
Kailua	450	450	
Hawaii:			
Kamuela	200	200	
Hilo	100	100	
Kauai: Kealia	100	100	

FRUIT FLY PARASITES.

Tetrastichus giffardianus.

Maui: Kula	750
Kauai: Kalaeo	500

Diachasma tryoni.

Maui: Kula	220	220
Kauai: Kalaeo	100	100

Opius humilis.

Maui: Kula	150	150
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Diachasma fullawayi.

Maui: Kula	220	220
Kauai: Kalaeo	100	100

Galesus silvestri.

Oahu: Nuuanu	100
--------------------	-----

Durinus giffardi.

Oahu: Nuuanu	250
--------------------	-----

HORN FLY PARASITE.

Spalangia cameroni.

Oahu: Moanalua	800
----------------------	-----

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

REPORT OF THE ENTOMOLOGIST, AUGUST, 1920.

Gentlemen: During the month of August the insectary handled 23,100 pupae of the melon fly, from which there were bred 3434 females and 2809 males, *Opius fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

	<i>Opius fletcheri.</i>	Females.	Males.
Oahu:			
Moiliili	400	350	
Kalihi	1500	1000	
Nuuanu	200	200	
Hawaii: Kamuela	250	200	

FRUIT FLY PARASITES.

Diachasma fullawayi.

Maui: Wailuku	150	150
---------------------	-----	-----

Galesus silvestri.

Oahu: Nuuanu 1000

Dirhinus giffardi.

Oahu: Nuuanu 800

Opius humilis.

Maui: Wailuku 100 100

Diachasma tryoni.

Maui: Wailuku 200 200

Tetrastichus giffardianus.

Maui: Wailuku 200

HORN FLY PARASITE.

Spalangia cameroni.

Oahu: Moanalua 1200

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

DIVISION OF PLANT INSPECTION.

REPORT OF THE CHIEF PLANT INSPECTOR, JULY, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen: I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of July, 1920, as follows:

During the month 63 steamers arrived at the port of Honolulu, 21 of which carried vegetable matter, and 9 vessels came through the Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	1426 lots	17,472 pkgs.
Fumigated.....	7 "	7 "
Burned.....	41 "	41 "
Returned.....	1 "	1 "
Total inspected.....	1475 lots	17,521 pkgs.

Of these shipments, 17,184 packages arrived as freight, 166 packages as mail and 171 packages as baggage.

RICE AND BEAN SHIPMENTS.

During the month 11,637 bags of rice from Japan, 750 matts of rice from China and 1394 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 1618 pieces of baggage belonging to immigrants from foreign countries were examined, from which 7 lots of fruit and 28 lots of vegetables were seized and destroyed.

On July 5 a package of mango seed found in the mail from Manila was seized and destroyed as contraband.

On July 7 a package of beans found in the mail from China was fumigated precautionary.

On July 8 the S. S. Tangaroa, from Fanning Island, brought 10 cases of empty bottles packed in straw in which two colonies of ants were found. From the condition of the straw, evidently these cases must have stood in a yard or near a landing for some time, as the straw was badly decayed and sow bugs, cockroaches and centipedes were found. The 10 boxes were placed on a truck on which a tarpaulin was laid, and hauled to the fumigating room and fumigated with carbon bisulphide.

On July 9 a lot of sandpears and two packages of corn were found in the mail from Japan, seized and destroyed. A package of beans and a package of vegetable seeds, also in the mail from Japan, were fumigated precautionary.

On July 11 a case of orchids brought from Manila by a passenger on the Marica was returned, being prohibited. A package of mango seed in the mail from Manila for the Board of Agriculture and Forestry was burned, being prohibited.

On July 17, two packages of dahlia bulbs from the mainland were fumigated on account of aphids.

On July 21 a package of seeds in the mail for Dr. Lyon, from the British Guiana Botanical Gardens, was fumigated precautionary.

On July 26 a lot of corn in the baggage of a passenger from the Orient was seized and destroyed as contraband. A package of dry beans in the mail from Japan was fumigated on account of weevils.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of five steamers at the port of Hilo. Three carried vegetable matter, consisting of 194 lots and 2063 parcels, all clean.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of 10 vessels at the port of Kahului. Three carried vegetable matter, consisting of 16 lots and 816 parcels, all clean.

INTER-ISLAND INSPECTION.

Sixty-two steamers plying between Honolulu and the other Island ports were attended and the following shipments passed:

Taro.....	540 bags
Vegetables.....	331 packages
Fruit.....	251 "
Plants.....	130 "
Seeds.....	1 "
Sugar cane.....	74 cases
Total passed.....	1327 packages

Fifty-five packages of plants (which includes Spanish moss), as well as

four lots of sugar cane, were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

REPORT OF THE CHIEF PLANT INSPECTOR, AUGUST, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of August, 1920, as follows:

During the month 59 steamers arrived at the port of Honolulu, 23 of which carried vegetable matter and three vessels came through the Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	1658 lots	25,415 pkgs.
Fumigated.....	3 “	3 “
Burned.....	34 “	34 “
Total inspected.....	1695 lots	25,452 pkgs.

(Of these shipments 25,132 packages arrived as freight, 150 packages as mail and 140 packages as luggage.

RICE AND BEAN SHIPMENTS.

During the month 26,922 bags of rice from Japan, 10 matts of rice from China, and 2451 bags of beans from Japan arrived and were found free from pests.

PESTS INTERCEPTED.

Approximately 4458 pieces of baggage belonging to immigrants from foreign countries were examined, from which 17 lots of fruit and 15 lots of vegetables were seized and destroyed.

On August 4 a package of seed in the mail from Australia for Dr. Lyon was fumigated precautionary.

On August 5 a package of bulbs found in the baggage of a passenger from the Orient was seized and held awaiting a permit from Washington.

On August 14 a package of limes for Port Allen from Mexico was seized and destroyed as contraband.

On August 20 a package of palm nuts in the mail was condemned as unavailable. A package of tree seeds in the mail from Manila for the Board of Agriculture and Forestry was fumigated precautionary.

On August 31 a package of peanuts found in the mail from Pago Pago was fumigated precautionary.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of five steamers at the port of Hilo. Two carried vegetable matter, consisting of 143 lots and 2119 packages, all clean.

KAHULUI INSPECTION.

Mr. Will J. Cooper, Inspector at Kahului, reports the arrival of seven vessels at the port of Kahului. Two carried vegetable matter, consisting of 18 lots and 1203 packages, all clean.

INTER-ISLAND INSPECTION.

Fifty-six steamers plying between Honolulu and the other Island ports were attended and the following shipments passed:

Taro	623 bags
Vegetables.....	412 pkgs.
Fruit.....	260 "
Plants....	119 "
Pine shoots.....	2239 bags
Seeds.....	4 pkgs.
Sugar cane.....	78 cases
Total passed.....	3776 pkgs.

Thirty-two packages of plants (which includes Spanish moss), 4 packages of fruit and 2 packages of sugar cane were refused shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector

DIVISION OF ANIMAL INDUSTRY.

REPORT OF THE ASSISTANT TERRITORIAL VETERINARIAN,
JULY, 1920.

Dr. V. A. Norgaard, Chief, Division of Animal Industry, Bureau of Agriculture and Forestry, Honolulu.

Sir:—I have the honor to submit the following report for the month of July:

TUBERCULOSIS CONTROL.

The following cattle were tested during the month:

	Tested.	Passed.	Condemned.
Waialae Dairy	3	3	0
Antone Pacheco	1	1	0
Waialae Dairy	29	28	1
Mrs. C. M. Cooke	1	1	0
Mrs. H. G. Isenberg	1	1	0
M. Rodrigues	2	2	0
M. Salado	12	12	0

A total of 49 head were tested out, of which number 48 were passed and 1 condemned.

Besides the above, autopsies were held on 20 head of condemned cattle, all of which were found to be affected with tuberculosis.

HEMORRHAGIC SEPTICEMIA (SUIS).

An outbreak of this disease, commonly known as swine plague, was reported from Kuoloa Ranch. About a dozen had died previous to vaccination.

After post-mortem verification of the diagnosis, 53 head were vaccinated. Jen-Sal. Mixed Infection Bacterin (Suis) being used. Since then no further losses have been reported.

IMPORTATION OF LIVE STOCK.

The following classes of live stock were received during the past month: Horses, 3; mules, 25; cattle, 42; dogs, 5; poultry, 161 crates; rabbits, 7 crates; monkeys, 1.

The cattle importations consisted of 15 Ayrshires and 27 Holsteins, all pure-bred registered stock.

Thirty-two vessels were boarded and inspected.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

REPORT OF THE ASSISTANT TERRITORIAL VETERINARIAN, AUGUST, 1920.

Dr. V. A. Norgaard, Chief, Division of Animal Industry, Bureau of Agriculture and Forestry, Honolulu.

Sir:—I beg to submit the following routine report for the month of August, 1920:

TUBERCULOSIS CONTROL.

	Tested.	Passed.	Condemned.
H. J. Andrews	1	1	0
Ant. Pacheco	6	6	0
Wahiawa Dairy	36	33	3
Mrs. C. M. Cooke	1	1	0
Kualoa Ranch	6	5	1
E. H. Wodehouse	1	1	0
M. T. Brazon	3	3	0
M. Salado	2	2	0

A total of 56 head of cattle were tested during the month, of which number 52 were passed and four condemned and branded. All four condemned animals were recent importations from the Coast which were held for retest at the Quarantine Station. Post-mortem examinations of three of these animals revealed positive lesions of tuberculosis.

CONTAGIOUS ABORTION.

In the control of this disease 104 head of cattle were vaccinated with contagious abortion vaccine. These cattle were located in two widely-separated dairies.

Good results are apparently following the use of this vaccine, especially when used in herds where breeding records are kept. However, further time must elapse before we can report definitely on the value of this vaccine as a preventative.

IMPORTATION OF LIVE STOCK.

Forty-four vessels were boarded for inspection during the month, of which number ten were found to carry live stock destined for this Territory.

The following classes of live stock were imported during the month: Horses, 3; mules, 104; cattle, 58; goats, 66; dogs, 8; poultry, 128 crates.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

J. M. DOWSETT

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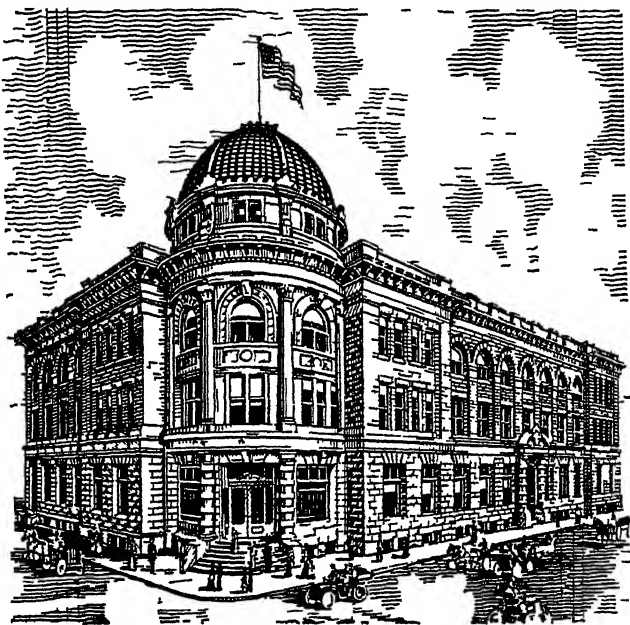
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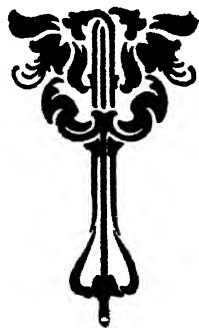
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Board of Agriculture and Forestry

DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEEDLINGS FOR SALE AT GOVERNMENT NURSERIES.

The Division of Forestry maintains the following nurseries on the several islands from which seedlings of the common forest and ornamental trees may be obtained at cost:

KALAHEO, KAUAI. Nursery at Papapaholahola Spring Reserve in charge of Joe Rita, Jr., Kalaheo.

Trees for planting on Windward Kauai may be obtained from the Kapaa School by applying to Mr. Geo. S. Raymond, Principal.

HONOLULU, OAHU. Government Nursery, King Street, in charge of Forest Nurseryman David Haughs, Box 207, Honolulu. Fresh tree seed may also be obtained from this nursery.

HAIKU, MAUI. Nursery in charge of Forest Ranger James Lindsay, Haiku.

HILO, HAWAII. Nursery at the Boys' Catholic School in charge of Bro. Matthias Newell, Hilo.

PRICES: Plants in seed boxes \$1.00 per 1000. Transplants in boxes 1c each. Transplants in pots 2½c each.

C. S. JUDD,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box, specimens may be mailed by parcels post. When specimens are not accompanied by letter, always write your name and address in the upper left hand corner of the package. Address all communications, DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

D. T. FULLAWAY,
Entomologist.

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No. 10

An article in this issue on the termites or white ants by Entomologist Fullaway describes the four species found in Hawaii, the damage they do, and suggests methods of control.

Mr. Louis Gillin of Kahului, Maui, was on September 1, 1920, appointed Fruit and Plant Inspector for the Island of Maui under the Division of Plant Inspection to take the place of Mr. Will J. Cooper, resigned.

It is of interest to learn from the Forest Nurseryman's report that seed of the African tulip tree, one of the popular trees for ornamental planting, can now be obtained locally.

The recent importation of some very high grade cattle, as described in the Territorial Veterinarian's reports, should greatly improve the dairy stock in the Territory. The importance, however, of securing such stock from government accredited herds is also shown in the same reports.

In this issue the Territorial Veterinarian continues his series of articles on the protection of live stock in Hawaii and deals with the disease known as *hemorrhagic septicemia*.

Hawaii has enough insect pests, as everyone knows, but there are still many others which the Division of Plant Inspection is strenuously endeavoring to keep out of the Territory. These are indicated by the Chief Plant Inspector in an article in this issue.

The following resolution was passed by the Board at a meeting held on September 9, 1920:

"WHEREAS, the forests of the Hawaiian Islands are being depleted, due mainly to the ravages of stock, and it is necessary in many districts to reforest in order to conserve the rainfall for purposes of irrigation; and

"WHEREAS, certain trees of the genus *Ficus* are considered suitable for purposes of reforestation, and should give results in an appreciably short time providing means are found to insure their spread by natural agencies;

"THEREFORE, BE IT RESOLVED by the Board of Agriculture

that the plan proposed by the Hawaiian Sugar Planters' Experiment Station to investigate the role of the chalcid flies commonly known as fig wasps in the fertilization of the seed of certain species of *Ficus* with the intent of introducing one or more species of the said fig wasps into the Hawaiian Islands is, after due consideration of the views and opinions of the various naturalists consulted and heard from, approved, and the Chief Plant Inspector is hereby authorized and directed to permit the introduction of said insects under the usual guarantees as to safety from harmful consequences."

REPORT OF THE ASSISTANT SUPERINTENDENT OF FORESTRY, SEPTEMBER, 1920.

October 14, 1920.

Superintendent of Forestry,
Honolulu, T. H.

Sir:—The following statement of my activities during the month of September is respectfully submitted:

The first week was spent in the office at Honolulu, and the remainder of the month on an extended inspection of the forest reserves on the island of Maui.

On September 11, in company with Mr. Atkinson, Ranger James Lindsay and Mr. Sam Baldwin, Manager of Haleakala Ranch, a trip was made into the Makawao Reserve to examine the site of a small water development project, for which permission is requested by the Haleakala Ranch. It is proposed to run a short tunnel under the waterfall of Pali-o-ka-Moa and pipe the water down from that point. From the standpoint of forestry no harm will be done by this project and the Division of Forestry has no objection to its execution. Jurisdiction over water rights, is held by the Commission of Public Lands and Mr. Baldwin was referred to that office for further action.

In company with Ranger Lindsay, a general tour of Maui was then begun. The upper portion of the Makawao forest was first examined and found to be in very satisfactory condition. Thrifty young koa and ohia trees are growing abundantly among the old dead trees and the general cover of shrubs and ferns is vigorous and complete.

A five day trip was made around Haleakala following a route through the crater, out through Kaupo Gap, and over the Ditch Trail. On the climb to the Rest House a detour was made to examine the experimental plantation of temperate zone conifers. The trail, after leaving Kaupo, gave a good opportunity to see something of the Kipahulu, Hana and Koolau Reserves. While the Koolau forest is adequately protected by the Ditch company, the same is not true of the other two reserves, and there is urgent need of stock-proof fences along their makai boundaries. Under present conditions cattle may run at will into these forests from the guava covered pastures immediately below. Before the onslaught of cattle and guava the forest is gradually retreating. The construction of fences along this boundary is among the most important forestry needs on Maui.

Along the Ditch Trail much young ohia is coming up among the dead trees, giving every promise of restoring this once luxuriant forest. Examination showed the young trees to be starting either upon the fallen trunks of tree ferns or from the bases of other dead trees. In the opinion of Dr. Lyon this means that the promising young forest is

only temporary and that as soon as the trees begin to thrust roots deeper into the toxic soil they will die in their turn just as the trees before them have died.

One day was spent riding over the Kula Reserve. The extreme upper portion of this reserve is quite barren, the intermediate altitudes have a considerable cover of mamani trees interspersed with kauau and other shrubs, which the lower levels, especially in the region of Polipoli spring, are rich grass lands. Owing to the prolonged drought on Maui, Mr. Harold Rice had been obliged during the past summer to turn several hundred head of cattle into that portion of the intermediate zone of the reserve which he owns in fee simple (Kaonoulu and Alae—1-2). Here the mamani showed the effects of browsing but the damage is neither severe nor lasting. On the whole the mamani seems to be increasing and spreading in Kula.

A trip was made to Ulupalakua Ranch where the old eucalyptus and cypress plantation on the surrounding hills were examined.

In company with Mr. Penhallow, the nursery and extensive plantings of the Wailuku Plantation were visited.

A request of the Pioneer Mill Company for tree planting advice was answered by a visit in company with Ranger Lindsay to Mr. Lyman, overseer at Puukolii. It was decided to have Ranger Lindsay examine the lands to be planted, determine the species to be used and then assist Lyman in establishing a nursery near the planting site. Seedlings will be started at Haiku nursery, but transplanting and all further work will be carried on by the plantation with Lindsay's advice. The Pioneer Company is anxious to do as much planting as possible on the slopes above their cane fields.

At the request of Mr. Angus MacPhee, a trip was made to Kahoolawe. Considering the drought which has prevailed for about two years, the vegetation on this desolate island is doing remarkably well. The algaroba is spreading in a very encouraging manner, but even more remarkable is the rapid spread of the Australian saltbush which was introduced a few years ago. This plant appears freshest and greenest of all the vegetation on the island, produces seed abundantly under the most severe conditions, is readily eaten by both cattle and horses and is not killed by grazing. The most difficult problem of this island is to get tree growth started on the wind-swept plateaus above an altitude of 800 feet. Here all the arable soil has been blown away and only the bare hard-pan remains. Mr. MacPhee proposes plowing furrows at strategic points, putting manure in the trenches and sowing algaroba seeds. If windbreaks can once be established in this way further planting will be much easier and cheaper. No better tree than algaroba could be used, but because of the hardness of the wattle that species was suggested to be tried in connection with algaroba.

Throughout the entire tour of Maui and Kahoolawe photographs of forest conditions were taken for the official album of the Division of Forestry.

Respectfully submitted,

CHAS. J. KRAEBEL,
Assistant Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN, SEPTEMBER, 1920.

October 13, 1920.

Superintendent of Forestry, Honolulu.

Sir:—I herewith submit a report of the principal work done during the month of September, 1920:

NURSERY.

Distribution of Plants.

The number of plants distributed amounted to 300 in transplant boxes and 1656 pot-grown, as follows:

	Transplant boxes	Pot- Grown	Total
Sold	150	142	292
Gratis	150	1514	1664
Total	300	1656	1956

COLLECTIONS.

Government Realizations.

Collections in account of plants sold	\$ 5.15
Rent of Building, Nursery Grounds for August	35.00
Total	\$40.15

Preservation of Forest Reserves, Etc.

Rent of premises at Halfway House, Tantalus for quarter ending September 30th	\$50.00
Fee for use of land and gathering ti leaf Kalawahine, Pauoa Valley, for quarter ending September 30th . . .	12.50
Rent of small piece of land in Pauoa Valley from April 1st to April 1st (1920-1921)	3.00

Black Sand.

94 loads black sand taken from Makiki Valley Sand pit at \$.50	47.00
Total	\$92.50

Animal Industry Revolving Fund.

Princeville Plantation Co.: To 2079 doses Anthrax serum and vaccine at \$.30	\$628.70
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SEED COLLECTING.

We have on hand a large quantity of seed of both forest and ornamental trees. The African Tulip (*Spathodea campanulata*) is seeding this year for the first time known to the writer.

We were fortunate in receiving from Madagascar about five years ago two pods of this beautiful tree. From the two pods we were able to raise over 2000 plants. Those we distributed to people all over the islands. From the trees planted around Honolulu, we were able this year to collect a large quantity of seed. We have been trying for the past two years or more to procure more seed from Madagascar, but without success, as this tree is in great demand. We can now get all the trees we want from seed collected here.

PLANTATION COMPANIES, ETC.

Trees distributed during the month amounted to 500 trees in transplant boxes.

MAIKI STATION.

The work done at this station consisted of the regular routine which includes the transplanting of trees into tins and boxes, sterilizing soil, etc.

HONOLULU WATERSHED PLANTING.

The principal work done on the watershed during the month consisted of clearing trials, clearing away vines and weeds from the young trees, etc.

LUALUALEI.

J. K. Luka reports that he planted during the month 930 *Eucalyptus resinifera*, 800 *Cedrela Australis* (Austrian Red Cedar), 1657 *Eucalyptus crebra*.

HILO SUB NURSERY.

Bro. M. Newell, in charge of the nursery for the Island of Hawaii, reports that he distributed during the month 212 trees in transplant boxes.

HAIKU SUB-NURSERY.

Mr. James Lindsay, in charge of the nursery for the Islands of Maui and Molokai, states that he distributed during the month 32 assorted trees.

KALAHEO SUB-NURSERY.

Joe Rita, Jr., in charge of the nursery for the Island of Kauai, reports that he distributed 400 trees in seed boxes and 529 in tins—total 929.

ADVICE AND ASSISTANCE.

The writer has been called upon to make visits and otherwise give advice and assistance as follows:

Visits made	6
Advice by telephone.....	5
Advice to people calling.....	8

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

REPORT OF THE ENTOMOLOGIST, SEPTEMBER, 1920.

October 13, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of September the insectary handled 19,900 pupae of the melon fly from which there were bred 4,727 females and 3,696 males, *Opius fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opius fletcheri.

	Females.	Males.
Oahu:		
Nuuanu Avenue	300	300
Kalakaua Avenue	200	200
Moiliili	1300	1250
Moanalua	1000	950

FRUIT FLY PARASITES.

Galesus silvestri.

Oahu:	
Nuuanu Avenue	800

Dirhinus giffardi.

Oahu:	
Nuuanu Avenue	500

Diachasma fullawayi.

Maui:		
Hana	100	100
Oahu:		
Pupukea	100	100

Fourteen queen bees were held in quarantine during the month as follows:

Brother James, St. Louis College.....	12 Italian
F. Santos	2 Carniolan caucasian.

As no brood disease had developed at the expiration of the term of quarantine, the surviving queens were delivered to the importers.

Respectfully submitted,

DAVID T. FULLAWAY,
Entomologist.

REPORT OF THE CHIEF PLANT INSPECTOR, SEPTEMBER, 1920.

September 30, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of September, 1920, as follows:

During the month 56 steamers arrived at the Port of Honolulu, 21 of which carried vegetable matter and 2 vessels came through the Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests.....	1620 lots	31,664 pkgs.
Fumigated	11 “	11 “
Burned	58 “	58 “
Returned	1 “	1 “
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Total Inspected.....	1690 lots	31,734 pkgs.

Of these shipments 31,429 packages arrived as freight, 192 packages as baggage and 113 packages as mail.

RICE AND BEAN SHIPMENTS.

During the month 10,971 bags of rice from Japan, 160 matts of rice from China and 1415 bags of beans from Japan arrived clean.

PESTS INTERCEPTED.

Approximately 4332 pieces of baggage belonging to immigrants from foreign countries were examined, from which 37 lots of vegetables and 17 lots of fruit were seized and destroyed.

On Sept. 3, three packages of plants found in the baggage of a passenger from the Orient were seized and destroyed. A package of Betel nuts from Manila and 3 packages of beans from Japan in the mail were fumigated precautionary.

On Sept. 5 a case of plants brought in the baggage of a passenger from the Colonies was burned. A package of seeds in the mail from the Forestry Division was fumigated precautionary.

On Sept. 11, two bags and one basket of herbs in the baggage of an immigrant from China were fumigated on account of weevils.

On Sept. 23, a package of vegetable seeds and a package of castor beans in the mail were fumigated, the former on account of weevils, the latter precautionary.

On Sept. 28 a dwarf pine tree was returned on board the Noma from the Orient, being prohibited. A package of Cocoa beans in the mail on the Ecuador was fumigated precautionary. A lot of puffed rice used as packing in the baggage of a passenger was found infested with weevils and fumigated.

HILO INSPECTION.

Brother M. Newell, Inspector at Hilo, reports the arrival of 5 steamers at the Port of Hilo. Three carried vegetable matter consisting of 141 lots and 3010 parcels, all clean.

KAHULUI INSPECTION.

Mr. Louis Gillin, Inspector at Kahului, reports the arrival of 9 ves-

sels at the Port of Kahului. Two carried vegetable matter consisting of 16 lots and 1737 parcels, all clean.

INTER-ISLAND INSPECTION.

Fifty-four steamers plying between Honolulu and the other island ports were attended and the following shipments passed:

Taro	610
Vegetables	277 cases
Fruit	253 packages
Plants	109 "
Pine Shoots	4685 bags
Sugar Cane	56 cases
Seeds	12 packages

Total Passed..... 6002 packages

Seventy-four packages of plants (which include Spanish Moss) were returned shipment on account of infestation, undesirable soil and not complying with the regulations.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

REPORT OF THE TERRITORIAL VETERINARIAN, JULY AND AUGUST, 1920.

September 25th, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to submit herewith my report on the work of the Division of Animal Industry for the months of July and August, 1920:

QUARANTINE OF DOGS.

The importation of dogs from the mainland of the United States and from foreign countries has of late assumed proportions which the regulations now in force do not seem adequately to cover. Reference is especially made to the number of chow dog pups which are being unloaded here by petty officers of the Oriental liners who make it a business to purchase these pups in Oriental ports and to dispose of them either here or in San Francisco and other ports, as opportunity offers. These dogs, or pups, are almost invariably infested with external and internal parasites, lice, fleas and ringworm externally, roundworms and tapeworms internally. Frequently they bring with them the infection of that most fatal of all dog diseases—dog distemper. When a case of dog distemper develops in the quarantine station, it becomes necessary to immediately vaccinate all dogs less than one year old, and frequently older dogs which have not acquired immunity through a previous attack. Such treatment costs, when administered by officers of this Board, from \$1.00 to \$2.00, and, if by practising veterinarians, about \$7.50 or more. Worm treatment and especially tape worm treatment these Oriental pups are, as a rule, not able to stand, many of them, while passing yards of tapeworms, becoming so weak that their vitality gives out and they die. When to this is added that all such pups upon arrival are

infested with fleas and that their tender skin and dense woolly coat of hair make it risky to apply disinfectants or insecticides which will kill the parasites without injury to the host, it will readily be seen that, in order to avoid the continued complaints of the owner of such dogs, and, on the other hand, to protect the bona fide importers of dogs held in quarantine, it will be necessary to amend the present dog importation regulations so as to insure that only healthy dogs are admitted to the Territory—or to quarantine—or at least dogs which may be reasonably counted on to possess sufficient stamina for acclimatization during the period of confinement. To meet this requirement, it is recommended that all dogs coming from foreign countries, and which are intended to remain here, shall be accompanied by a certificate of health issued or approved by the proper live stock official of the country of origin, or at the port of embarkation, showing that such dogs have been vaccinated against distemper and have been submitted to an approved course of worm treatment and disinfecting baths, immediately before shipment. The same shall apply to pups and young dogs coming from the United States and Canada, unless they are the bona fide property of temporary visitors or tourists.

In case of arrival of such dogs without such certificate of health, the owner shall, when so required, provide competent veterinary attendance for the period necessary for the destruction or removal of internal and external parasites and for the treatment of any case of distemper which might develop before vaccination has been applied and become effective. Vaccination for distemper requires three hypodermic injections at intervals of two to five days and frequently is accompanied by severe malaise. The treatment for intestinal worms also may require repeated treatments and cannot be undertaken simultaneously with vaccination, on account of its debilitating effect. If badly infested with fleas, lice or ticks a single bath does not suffice and should, especially in the case of young dogs or pups, always be undertaken with care. When to this is added vaccination for rabies, which requires six inoculations on six consecutive days and which undoubtedly will have to be applied to a majority of all incoming dogs as soon as it has been proven effective and safe, it will be seen that, unless part of these various treatments are undertaken before the dogs arrive here, the vaccination for rabies will have to be postponed for such length of time as these treatments may require, and the length of the quarantine period equally extended.

Under normal circumstances, that is, when dealing with healthy dogs that have either acquired immunity to or been vaccinated against distemper, and that are not infested with parasites or vermin to such an extent as to require immediate treatment, the rabies vaccination may be applied within a few days after arrival and the quarantine period reduced from 120 days to approximately 45 days.

The Antirabic Treatment or Vaccination of dogs, which have been exposed to rabies infection, is known as the Hogyes Dilution Method and differs from the Pasteur treatment in that it employs unattenuated but much diluted rabies virus, and requires only six injections as compared to Pasteur's twenty-one to twenty-five injections. The six injections are administered hypodermically on six consecutive days and cause little or no inconvenience to the patient. It has been used during the past few years with signal success on thousands of animals bitten by rabid wolves and dogs in the United States.

Nearly two years ago when our attention was first called to this vaccine efforts were made to obtain it for use here as a substitute for the prolonged quarantine. The material, however, deteriorates very rapidly, that is, it loses its effectiveness in from four to six days unless kept at a very low temperature. As the vaccine, at that time, was made only in New York, from whence shipment to Hawaii would require two to three weeks, the manufacturers advised against using it here,

stating that even on the mainland the six injections, constituting one treatment, are shipped on six consecutive days in order to avoid deterioration in transit. These difficulties have now been overcome. The vaccine we are now experimenting with is made by the Cutter Laboratory at Berkeley, California, and is shipped in thermos bottles placed in the refrigerator of any fast boat immediately before departure from San Francisco. The boat is met upon arrival and the vaccine transferred to the laboratory of this office. As a further precaution, the ground brain substance, or virus proper, and the dilution fluid come in separate containers and are not mixed until immediately before the injection is to be made. Under these conditions the manufacturers assure us that the vaccine will retain its effectiveness for at least two months.

The only drawback to this treatment is that we are dealing with the unattenuated virus of an absolutely fatal disease, and while no cases have been recorded of dogs developing rabies as a result of the vaccination, the manufacturers insist on the vaccinated animals remaining in quarantine for one month after the last injection. We have now at the quarantine station two dogs, one setter and one fox terrier which passed the fifth week after vaccination, and eight other dogs, including four chow pups, which have received all six injections at varying periods of from one to three weeks past. None of these has so far shown any unfavorable results from the treatment. When these eight dogs have passed the requisite period of one month from the last injection, an amendment to the present dog quarantine regulation covering the subjects under consideration will be submitted to the Board.

Importation of High-priced Dairy Cattle from Non-accredited Herds on the Mainland.

An unusual large number of high class breeding stock has arrived here during the past two months. An importation of Holstein cattle for the Parker Ranch, consisting of five young bulls and twenty heifers is valued at \$40,000.00. One bull calf and one heifer cost \$5,000.00 each. They all came from New England and were selected by Professor W. L. Williams of Cornell University. They were accompanied on the entire trip by Dr. Adrian M. Mills, a graduate of the New York State Veterinary College, Cornell University, who will remain in charge of this new dairy herd.

As these animals did not come from a government accredited herd they had to be retested. Fortunately they all passed the test. Had any of them reacted they would have had to be either slaughtered here or returned to the former owner. In the first case the owner would not be entitled to any compensation, if upon post-mortem examination, lesions of tuberculosis were found to be present. Otherwise the Territory would have had to pay the full appraised value or, in other words, what they had cost landed here.

As the tuberculin test is not infallible, I attended to the retest, which was made on the Parker Ranch, in person. To prove the presence of tuberculosis in cattle which have passed a careful tuberculin test less than two months previously and which have not been exposed to infection during that time is far from easy. The lesions in nearly all cases will be found to be very small and may be located in out of the way places as, for instance, inside a joint. In such a case it may become necessary to cut an otherwise perfectly good carcass to mince meat, whereby additional loss is caused.

We are however confident that the tuberculin test originated here, the intrapalpebral test, is the most reliable of them all, and that when a decided reaction occurs the lesions can be found in 99% of the cases, if not in all.

Another importation arriving in August consisted of 35 high grade

Holstein cows and one registered bull. When retested here three of the cows, valued at about \$300.00 each, gave typical reactions. They were slaughtered and lesions, small but characteristic of the disease, were found in all. The carcasses netted the owner \$260.00. His herd has been free of tuberculosis for a number of years and the effectiveness of our test, as compared to that which had been used on the same animals previous to shipment, saved his herd from reinfection and the Territory from subsequent indemnification disbursements.

A third importation coming from Kentucky consisted of two bulls and four heifers, all registered Holsteins. On retest here one of the bulls, Champion Korndyke Pontiac Segis, gave typical reaction. The original owners declined to have the bull returned, but requested that it be held here for two months and then retested. To this we have agreed with the understanding that the animal will be slaughtered whether it reacts to the retest or not, on the principle that "once a reactor always a reactor."

The swelling of the eyelid resulting from the tuberculin injection was the size of a walnut and constituted what we consider a most decided reaction, and we have no doubt that tuberculous lesions will be found on post-mortem. If not, the Territory must reimburse the owner the full value of the animal, \$500.00 plus shipping expenses. On the other hand, the presence of tuberculosis being proved, the original owner agrees to substitute an equally good animal for the destroyed one without loss to either the Territory or the importer.

Proposed Amendment of Act 204, S. L. 1919.

From the above quoted cases, it would appear that to safeguard the Territory against the possibility of having to reimburse an importer of fancy herd toppers or high priced breeding stock, which may have passed a tuberculin test somewhere in the United States, but which come from an infected herd or from a herd which has not been officially proved to be free of tuberculosis, it will be necessary to amend Act 204, S. L. 1919, as follows:

Sec. 4 of this Act reads:

"Indemnification. The amount of indemnification shall be based upon the results of the post-mortem inspection as follows:

"(a) If an animal is found upon post-mortem examination not to be affected with tuberculosis, the owner shall be paid the full appraised value less the salvage of the carcass."

To the above paragraph it is suggested to add:

"The same shall apply to registered cattle imported from the mainland of the United States, coming from herds accredited by the federal Bureau of Animal Industry as being free of tuberculosis, and which have not been exposed to infection in transit. Indemnification for unregistered cattle and cattle coming from unaccredited herds or which have been exposed to infection in transit or within six months after arrival shall, if condemned before admission to the Territory, be limited to the same amounts as in paragraphs (b), (c) and subsequent parts of this section for tuberculous cattle specified."

The aim of this amendment is simply to insure that the importers of cattle should take every precaution possible to guard against the introduction of tuberculosis and to avoid the possible, though remote, contingency of the Territory having to disburse large sums of indemnification for imported cattle which react to the tuberculin test, but which cannot

he proved upon post-mortem examination to be affected with the disease.

Reports of Deputies.

From Hawaii, Dr. Elliot reports the arrival of a considerable number of registered Hereford and Holstein cattle, principally for the Kapapala Ranch, Pahala and Hateninson Sugar Plantation. A severe outbreak of gastro-enteritis occurred among some of these cattle while at the quarantine station, due probably to musty hay which arrived with the cattle and which may have been exposed to dampness on board the steamer. Four valuable animals were nearly lost and one mule fed on the same hay died.

Dr. Elliot is gradually rebuilding the Hilo quarantine station, substituting concrete for redwood posts, and installing a new water supply. The prolonged drouth had caused all the tanks to go dry, leaving the station useless for quarantine purposes.

From Kohala, Dr. Rowat reports a case of glanders in a plantation stable where the disease has not been known for years. He requests my assistance with a view to a thorough examination of all horse stock in the Kohala district and the mallein testing of all animals in a number of stables for the purpose of locating a possible "carrier" which he has long suspected the presence of.

Dr. Rowat has resumed tuberculin testing in Kona. With an official district extending over more than one hundred miles—from Kohala to Kau—and side trips off the belt road aggregating an equal distance, on miserable roads, with tires, oil and gasoline advanced from 50 to 100 per cent, Dr. Rowat states he cannot afford to supply his own car at ten cents per mile, the pay hitherto allowed him. The opportunity for private practice in this district is the poorest in the Territory, there being but one sugar plantation between Kohala and Kau. A substantial increase in Dr. Rowat's remuneration for official work is recommended. He supplies his own car, and the withdrawal of his services would embarrass this office and render the tuberculosis eradication act ineffective in a large district.

From Maui, Dr. Fitzgerald reports progress in the control of infectious abortion by means of the vaccines and bacterins supplied by this office. The same applies to a quite extensive outbreak of influenza (infectious catarrhal fever) among the plantation work animals, which are being successfully treated with influenza bacterins.

From Kauai, Dr. Golding reports that swine plague has become endemic in the Lihue district. He has been supplied with the requisite remedies for control of this outbreak.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF THE TERRITORIAL VETERINARIAN, SEPTEMBER,
1920.

October 13th, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to submit herewith my report on the work of the Division of Animal Industry for the month of September, 1920:

IMPORTATIONS OF LIVE STOCK.

During the month of September there arrived at this port 22 dogs of which number 18 have been treated with anti-rabic vaccine.

In reply to an inquiry, addressed to the Cutter Laboratory, Berkeley, California, in regard to the length of time that dogs treated with this vaccine must be kept under observation, the manufacturers stated that they did not consider it advisable to reduce the quarantine period for the animals in question to less than 30 days. This will, however, reduce the quarantine period for the animals to 38 to 40 days and the dogs can be released November 2-5, in case the Board approves the amendment to Rule VIII pertaining to the importation of dogs, copy of which is appended.

The Holstein bull at the Quarantine Station, which reacted to the tuberculin test, as reported last month, will be retested October 14th, and will then be slaughtered, the owners having decided that it would be too expensive to return the animal to Kentucky.

There arrived during the month nearly 100 large animals and it became necessary to engage an assistant for the caretaker of the quarantine station. With more than 30 dogs, besides the other animals, it is impossible for one man to attend to them all properly and an assistant was engaged for the month at the rate of \$65.00. Such expenditure was approved by Mr. Judd for the month of July with the understanding that the assistant should not be permanently employed but only for such periods when an unusual number of animals were at the station. It is, however, recommended in case funds can be provided that the caretaker be furnished an assistant permanently. There is a great deal of work to be done in repairs, painting and cleaning up and I am informed that considerable importations of both cattle and mules may be looked for in the near future.

The caretaker has further been handicapped in his work on account of lack of water. Our pipe line has recently been tapped for the benefit of a neighboring house where they seem to use considerable water. This was done without consulting either the caretaker or myself.

While in Hilo recently I found at the animal quarantine station four 5,000 gallon water tanks the use of which has been discontinued by the installation of city water. I would, therefore, suggest that we have one of these tanks knocked down and shipped to Honolulu, the same to be set up at the quarantine station on a scaffolding sufficiently high to provide pressure for irrigation as well as for keeping the water troughs full. The cost will probably not exceed \$100.00.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF THE ASSISTANT TERRITORIAL VETERINARIAN,
SEPTEMBER, 1920.

October 14, 1920.

Dr. V. A. Norgaard, Chief Bureau of Animal Industry, Honolulu, T. H.

Sir:—I beg to submit the following report for the month of September:

TUBERCULOSIS (CONTROL).

	Tested.	Passed.	Condemned.
M. T. Bazon	3	3	0
T. Nakamoto	7	7	0
M. P. Moranho.....	3	3	0
H. K. Wilder.....	1	1	0
S. I. Shaw.....	2	2	0
Geo. P. Cooke.....	2	2	0
Wahiawa Dairy	4	4	0
M. Freitas	4	4	0
M. Salado	2	2	0
M. Freitas	2	2	0

A total of 30 head were tested during the month, all of which passed the test. Besides the above, several post-mortem examinations were made on previously condemned cattle.

ANTI-RABIC VACCINE TREATMENT.

During the past month 19 dogs were given the anti-rabic vaccine treatment. All are apparently doing well and will soon be released from quarantine.

IMPORTATION OF LIVE STOCK.

A total of 54 vessels was met and boarded by the livestock inspector, of which number 10 were found carrying livestock for this port. The following classes of livestock were represented:

Horses, 3; mules, 79; cattle, 18; swine, 3; dogs, 22; cats, 1; goats, 61; poultry, 137 ets.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

THE PROTECTION OF LIVE STOCK IN HAWAII
AGAINST INFECTIOUS AND CONTAGIOUS
DISEASES (II).

By VICTOR A. NOEGAARD, Territorial Veterinarian.

Hemorrhagic septicemia. Next to anthrax—known to Ptolemies as one of the plagues of Aegypt—is another disease of quite modern antecedents. The old German textbooks refer to it as "Wild-und Rinderseuche," wild standing for game and Rinderseuche for disease of cattle. It is a disease far more dangerous than anthrax. It was first noticed in these islands on the Parker Ranch in 1909. The writer, being then employed by the federal Bureau of Animal Industry, reported the outbreak, which only covered less than a dozen head of cattle. He was in turn informed that this disease had appeared and been recognized by veterinarians in six of the eastern states. The following year, 1910, it was all over the Middle West. The following year it

was killing the buffalos in the Yellowstone Park. Then Dr. Mohler, now Chief of the Bureau of Animal Industry, went out and made a vaccine. That is what we are using here now.

It converts in short time the healthy organs of an animal into the most hideous conglomerations of diseased tissue. Lungs that were pink and inflatable a day before become green solid masses of tissue interspersed with gelatinous streaks. Guts that were hitherto named for their emptiness (Jejunum) become filled with blood. Organ cavities—chest and abdomen—fill up with gelatinous clo's, the lymph-glands that were provided for the protection of the organism, simply throwing up their hands and crying "Help." A disease that makes the veterinarian sit up and take notice. Where would we be if the last legislative assembly had not provided for it? We—the Division of Animal Industry—had on hand between five to six thousand doses of anti-hemorrhagic septicemia vaccine and applied it in the outbreak of this disease in Kau, Hawaii. We had to have new shutes built and the cattle were vaccinated. Only 160 out of 6,000 died, a better record than the anthrax one. What would have happened, had we not had on hand the vaccine, may be guessed at.

We have now on hand between five to six thousand doses of anti-hemorrhagic septicemia vaccine, and unless the disease should break out all over at the same time, we shall be well able to take care of it. *This, however,* is the disease that I, as Territorial Veterinarian, dread more than anthrax or any other disease.

The cost of vaccination for hemorrhagic septicemia is about \$.11 per dose. The curative dose of serum is \$2.50, but it does not always cure.

(To be continued.)

ARE THE AGRICULTURISTS OF HAWAII FORTUNATE?

By E. M. EHRHORN, Chief Plant Inspector.

In an article in the "California Cultivator" of May 22, 1920, entitled "Animals Destructive to Agriculture," the author places these animals in two classes—rodents and predatory animals. In the first class are house, meadow and field mice, house and Kangaroo rats, ground squirrels, pocket gophers, jack and brush rabbits. In the predatory class are coyotes, wild cats and mountain lions. The first class, on account of the size of the animals and greater numbers, is nearly a hundred times as destructive to agriculture as the second class. A conservative estimate of the present losses to the farmer amounts to about \$45,000,000.00 divided as follows: \$20,000,000.00 from ground squirrels, \$15.

600,000.00 from pocket gophers, \$5,000,000.00 from rabbits, all others \$5,000,000.00. Losses from predatory animals are hard to estimate, but from the State of Utah a report estimates that 500,000 head of sheep were destroyed in 1915. Owing to a systematic control through hunting, trapping and poisoning, a material decrease was obtained, in 1919, only 75,000 head of sheep being killed.

What bearing, if any, has the above on Hawaii? We have some field mice and field rats, house mice and common rats, but we have no ground squirrels, pocket gophers, jack and brush rabbits, and these are the ones which do the greatest damage to growing crops. Again, as far as predatory animals are concerned, Hawaii is free from them and we can consider ourselves fortunate. At times one hears fellow citizens remark about the folly of trying to keep out pests. "Why, we have got all the bugs there are right here in the Territory." In 1917 the U. S. Dept. of Agriculture published a bulletin entitled "A Manual of Dangerous Insects Likely to be Introduced in the United States Through Importations." In looking over the enormous list of pests cited, let me just touch on a few crops that we are interested in, and their insect enemies.

SUGAR CANE. The sugar cane industry here was once threatened by the cane leaf hopper and, had it not been for the finding of parasites to cope with it, no doubt we would be experiencing a terrific loss annually. There are many other species of cane leaf hoppers in other countries. Mr. Muir recently enumerated 21 that he knows of in the Orient, Malay Archipelago, Philippines and others in Africa not yet named. There are a lot of other pests such as leaf miners, stem borers, root borers, defoliating moths, aphids or plant lice and scale insects in many parts of the world especially on the Islands of the Pacific Ocean. Also, there are many diseases of cane known to exist in the Orient, Malay Archipelago, Queensland, Fiji and other countries which could easily be brought here in soil or other materials if it were not for our strict quarantine rules and regulations.

PINEAPPLES. Within the last ten years the pineapple industry has grown from a very small industry to enormous proportions. Practically speaking, there are no serious pests here to hamper this industry, yet the records show that many very injurious pests exist in other countries. In the West Indies, for instance, they have a borer which works into the root of the plant and tunnels up into the stem and into the growing fruit, causing enormous losses to the crop. In Fiji, only a ten day trip from Honolulu, they have a fruit fly which attacks pineapples. In the Philippines they have a blight which kills off hundreds of acres annually.

RICE. One of the main foodstuffs of the Oriental race is rice and, although the industry here is not what it should be, it is, practically speaking, free from serious pests. Two rice stem

borers from India are known here. Of leaf hoppers and true bugs, there are 17 species recorded from Formosa, India, China, Japan and the Philippines. There are 3 root borers of the rice plant recorded from India and Formosa, also a number of leaf-eating beetles and moths from India, Japan, China and Java. If any or all should ever gain a foothold here, it would go hard with our rice growing industry.

SWEET POTATOES. The few pests which gained admission to these Islands as attacking sweet potatoes came here before the Horticultural Quarantine was started. This, we know, for we still find these same pests at times in the shipments arriving today. Fortunately only a few came, as the records show that there is another borer in Liberia, some leaf hopper in Java and India and other pests in various countries of the Pacific.

BANANAS. We have only 2 or 3 minor pests attacking our banana industry. About eleven pests are reported from other countries among which is a very destructive borer. This species has been intercepted on several occasions. In Fiji there is the banana fruit fly which does much damage to the fruit, also a species in New Hebrides, Queensland and New South Wales which does similar damage. In Central America a disease known as the "banana blight" has killed off thousands of acres in one year. Fortunately our rules and regulations prohibit the importation of banana plants and fruit, so that only through accidental introduction can these pests become established.

CITRUS FRUITS (oranges, lemons, limes, etc.) We have a few pests which damage our citrus fruits especially the Mediterranean fruit fly. However, the records show that no less than six other fruit flies exist in the Orient, India, Fiji, Mexico, Central and South America and the West Indies.

COCOANUT PALM. Our cocoanut palm and fruit is, on the whole, free from serious pests—pests which would threaten the life of the plant. We have a leaf roller which does considerable damage in favorable seasons. We also have a few scale insects infesting the plant but there are many more serious pests in foreign countries which not only damage the palms but kill them outright. In the Philippines and Cuba a disease often kills off the groves, just as if a fire had swept through them. In Samoa the two cocoanut beetles (these are as large as your thumb) do a great deal of damage to the palms, often killing acres in one season. These pests are so serious that the governments of the different islands prohibit the transportation of cocoanuts from one island to another. Fiji has many serious pests of the cocoanut palm. Several large palm weevils exist on the Islands of the Pacific and in the West Indies.

One could go on thus almost indefinitely, but let us be assured that although Hawaii's agriculture has its insect and fungus enemies, we are exceedingly fortunate in not having more of those on the outside which are also, according to the record be-

fore us, more injurious than those we now have. Eternal vigilance and the strict enforcement of plant quarantine regulations are the price to be paid for immunity from these pests of other countries.

TERMITES, OR WHITE ANTS, IN HAWAII.

By DAVID T. FULLAWAY, Entomologist.

INTRODUCTION.

The damage done by termites, or white ants, to wood, wood-work and wood products has increased noticeably in the past few years in the city of Honolulu, and the resulting losses have been the occasion of considerable anxiety in certain quarters.

These insects have been familiar to residents of the islands in the past by their invasion of dwellings, where occasionally their destructive activities in furniture and wood work would make itself apparent. The earliest investigations of the fauna of the islands¹ revealed the widespread presence of two species, referred respectively to *Kaloterms marginipennis* and (*Neoterms*) *Kaloterms castaneus*, the latter, however, being a true forest insect and confining itself entirely to the decaying wood of trees.

The previous destruction wrought by these species is slight compared with that being done at the present time. The change which has occurred in this respect is to be accounted for by the entrance at Honolulu of two vastly more destructive species, namely *Coptotermes intrudens*, which was first noticed in 1913,² and a species *Cryptotermes*, referred to *C. brevis*, which has probably been here since 1904. These species are spreading rapidly, but at present are confined principally to Honolulu.

The serious nature of these insects becomes apparent on considering the large use made of wood in construction throughout the islands, and the difficulty experienced in combatting them or in attempting to restrain their spread. It has therefore been necessary to give some attention to their study, which has been very much neglected. Their cryptic habits, however, render them difficult objects in this regard, and the investigations being made of their biology cannot soon be completed. In view, however, of the importance of the subject, the need of attracting attention to them and of educating the public in regard to the means of circumventing or destroying them, it is considered advisable to publish the following general account at once. The results of the investigations will be made known at convenient times later.

¹ Am. Nat. Hist. (5) XII, 1883, p. 227; F. H. II (2), p. 88.

² Proc. H. E. S. III (1), p. 27; Intr. to F. H., p. clxxiv.

NATURE OF THE TERMITE³

The term "white ant," commonly used for the insects under discussion, probably has such vogue that it cannot be replaced now, but since it associates these insects with the ordinary ant, and one is led to suppose that they differ chiefly in their color, it is confusing and should give way to the more distinctive name "termite." Beyond the circumstance that they are both social insects and that a somewhat imperfect analogy can be drawn between their different forms and habits, termites have no resemblance to the ordinary ants and their affinities, based on structure, are with quite different insects. The term "borer," applied to them, is likewise insufficiently discriminating, although accurately descriptive of some of the species, particularly those which have been here the longest and with which older residents are familiar.

Termites, though highly specialized like the ants, are on the other hand insects of relatively low organization and are believed to be derived from the ancestors of the *Blattidae* or cockroaches, which is evident from the structure of the wings of the most primitive form. On account of their specialization, however, they are now held to constitute a distinct order of insects, to which the name Isoptera is applied. More than 800 species have been described. They are world-wide in distribution, but the tropics contain the richest representation. They have thirteen distinct body segments in addition to the head. The body is terminated by a pair of short cerci, and in the male (and sometimes in the female also) there is a pair of stylets near the middle of the hind edge of the 9th ventral segment. The integument is delicate and the chitinous plates are never very hard. Frequently they are so slightly developed that the creature appears to consist of a single membranous sac with creases in it, the head alone being very distinct. The antennae are short, moniliform, multisegmented. The wings of termites are not like those of any other insects. The four wings are in repose laid flat on the back, so that the upper one only is seen except at the base. They are membranous and very elongate, extending far beyond the apex of the abdomen. The hind pair is closely similar in size, form and consistence to the front pair. The neurotation is very simple. The most remarkable feature of the wing, however, is its division into two parts by a suture or line of weakness, along which it can be broken off, the stumps in that case remaining as short, hairy flaps reposing on the back.

Termites live socially in large or small colonies, and exist in two or three castes, usually a soldier caste (with modified head), a worker caste (absent in *Kaloterms*), and the winged caste, which is always present. The winged caste consists of the male and

³ This general account of the Termites is adapted from Cambridge Natural History (Insects) by David Sharp, chap. XVI. Termites.

female adult insects, which have functional, faceted eyes and a pair of ocelli or simple eyes. The wingless individuals are very numerous and are more or less blind, at least the soldiers are generally without eyes.

The colony is started by the winged males and females, which, after the swarm flight referred to later, drop their wings and seek a suitable place for a nest. These are known as colonizing forms.

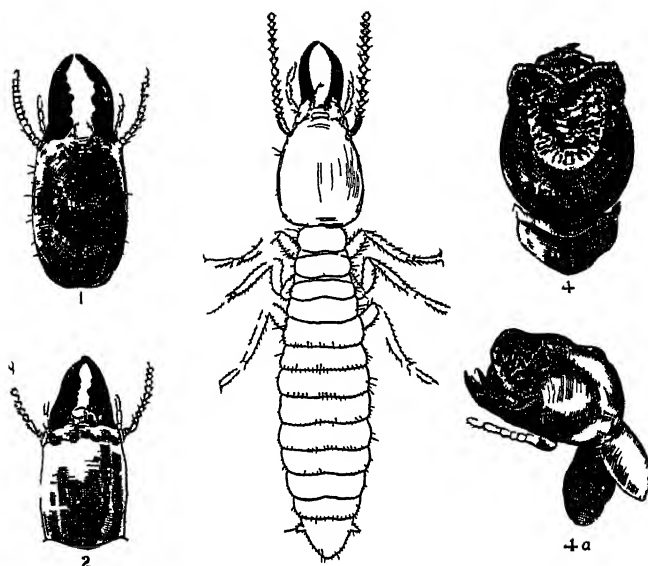
After some time the female becomes enlarged with eggs, often to a very great extent, when she is known as the queen or true queen, or queen mother. In some species the true queen is rare, or at least difficult to find. Sometimes nymphal forms become fertile and serve as complementary or substitute queens. They are referred to as "neotines." The soldier is usually more or less characteristic for each species. The initial growth of the colony is slow. Only a few eggs are laid in the beginning, which hatch after a period of incubation. The young are at first undifferentiated larvae. These give rise to the different forms already referred to, soldier larvae and soldiers, worker larvae and workers (where present), and nymphs and adult winged males and females or neotenic forms. The metamorphosis is slight and gradual and in some individuals is dispensed with. It would appear that fully a year elapses between the hatching of the egg and the development of the winged insect, although the soldier may complete its development in less than a year. It is probable that the queens endure several years. As a result of termite economy, large numbers of superfluous individuals are frequently produced in a nest. These in the winged state leave the community, forming swarms which are often of enormous extent. They are eagerly preyed on and most of the individuals destroyed, but the small proportion which escape begin the establishment of new colonies, as already related.

SPECIES OF TERMITES FOUND IN HAWAII, THEIR RELATIONSHIP AND HISTORY.

As stated above, there are now found in Hawaii four species of termites generically distinct and belonging to two separate families and sub-families, according to the following tabulation:

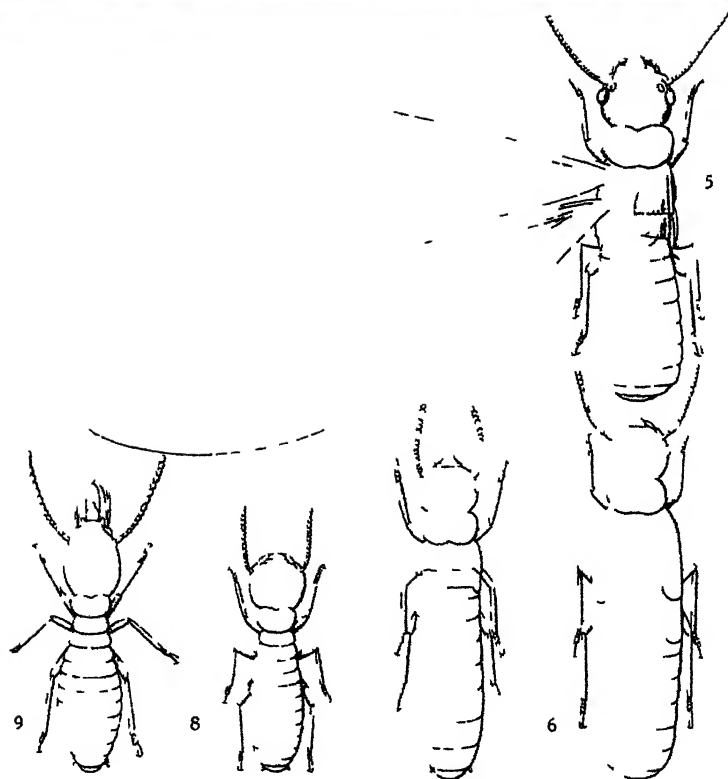
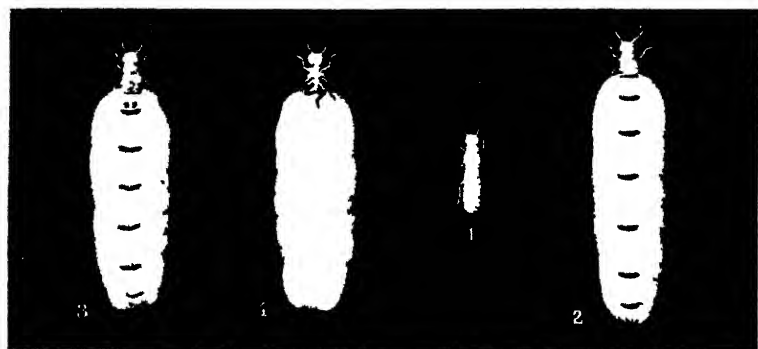
Fam.	{	<i>Kaloterms</i> referred to <i>marginipennis</i> Latreille	
<i>Kalotermitidae</i>		<i>Neoterms</i>	" <i>castaneus</i> Burmeister
Sub-fam.		<i>Cryptoterms</i>	" <i>brevis</i> Walker.
<i>Kalotermitinae</i>			
Fam.	{		
<i>Termitidae</i>			
Sub-fam.			
<i>Coptotermitinae</i>		<i>Coptoterms intrudens</i> Oshima	

PIATE I



- FIG. 1 *Neotermes* sp. referred to *castaneus* Burm. head of soldier $\times 5$
 2 *Klotermes* sp. referred to *marginipennis* Latr., head of soldier
 $\times 5$
Coptotermes intrudens Oshima, soldier $\times 9$
 4 *Cryptotermes* sp. referred to *brevis* Walker, head of soldier,
 top $\times 11$
 4a *Cryptotermes* sp. referred to *brevis* Walker, head of soldier
 side, $\times 10$

PLATE II



Coptotermes formosanus Shinaki, a destructive Formosan species closely allied to **Coptotermes intrudens** Oshima

- | | |
|-------------------------------|--|
| 1. King $\times 2$ | 6 Nymph of winged form $\times 10$ |
| 2 Queen $\times 2$ | 7 Nymph of substitute royal form $\times 10$ |
| 3 Queen $\times 2$ | 8 Worker $\times 10$ |
| 4 Queen under side $\times 2$ | 9 Soldier $\times 10$ |
| 5 Winged form $\times 10$ | |

(Copied from Y. no, White Ants in Japan)

On the authority of Dr. T. E. Snyder,⁴ of the U. S. Bureau of Entomology, who has examined specimens of termites from Hawaii and compared them with authentic material, the three Kalotermites have been erroneously referred to the species named and are distinct from any species previously described. They will therefore soon be described as new.

The species of *Coptotermes* was recently described⁵ by Mr. Masamitsu Oshima, of the Institute of Science, Government of Formosa, from specimens taken by the writer. It is said to be very closely related to *Coptotermes formosanus*, the destructive Formosan species, and is probably Asiatic in origin, although the genus is represented in Australia, South America and Madagascar. As previously stated it was first noticed in Honolulu in 1913. In the meantime, it has slowly spread and occupied new ground, but has not gone generally beyond the limits of the city as far as I know. I believe the infestation of sugar cane discovered at Pearl City is the only instance of its occurrence outside.

The species of *Cryptotermes* found here, although the winged forms were collected as early as 1904, was not distinguished from *Kalotermes marginipennis* until 1917 when soldiers were discovered, compelling immediate discrimination. The head of the *Cryptotermes* soldier is large and thick and has a deep cavity in the front—a very distinct type.

HABITS OF HAWAIIAN TERMITES.

A striking difference is found in the habits of the species distinguished above in respect to their family relationship, and as the three species included in the *Kalotermitinae* are essentially similar in habit, it is only necessary to discuss the habits of one, the species of *Cryptotermes*, which will serve as a type of that group in the same way that the species of *Coptotermes* serves as a type of the *Coptotermitinae*.

Habits of *Cryptotermes*—typical of *Kalotermitinae*. The species of *Cryptotermes* and its congeners are essentially borers. Unlike other termites, they are able to live in dry wood, to which they gain access by boring an entrance hole. Once inside, their galleries are extended lengthwise with the grain of the wood and widened in places. Here is formed the simple nidus. Around the royal pair are the larvae, nymphs and soldiers, and adhering to the walls usually a few eggs. There is no worker caste in this group. Colonies usually consist of less than a hundred individuals but are generally closely spaced and numerous. Often lateral, communication channels are formed,

⁴ Snyder in litt.

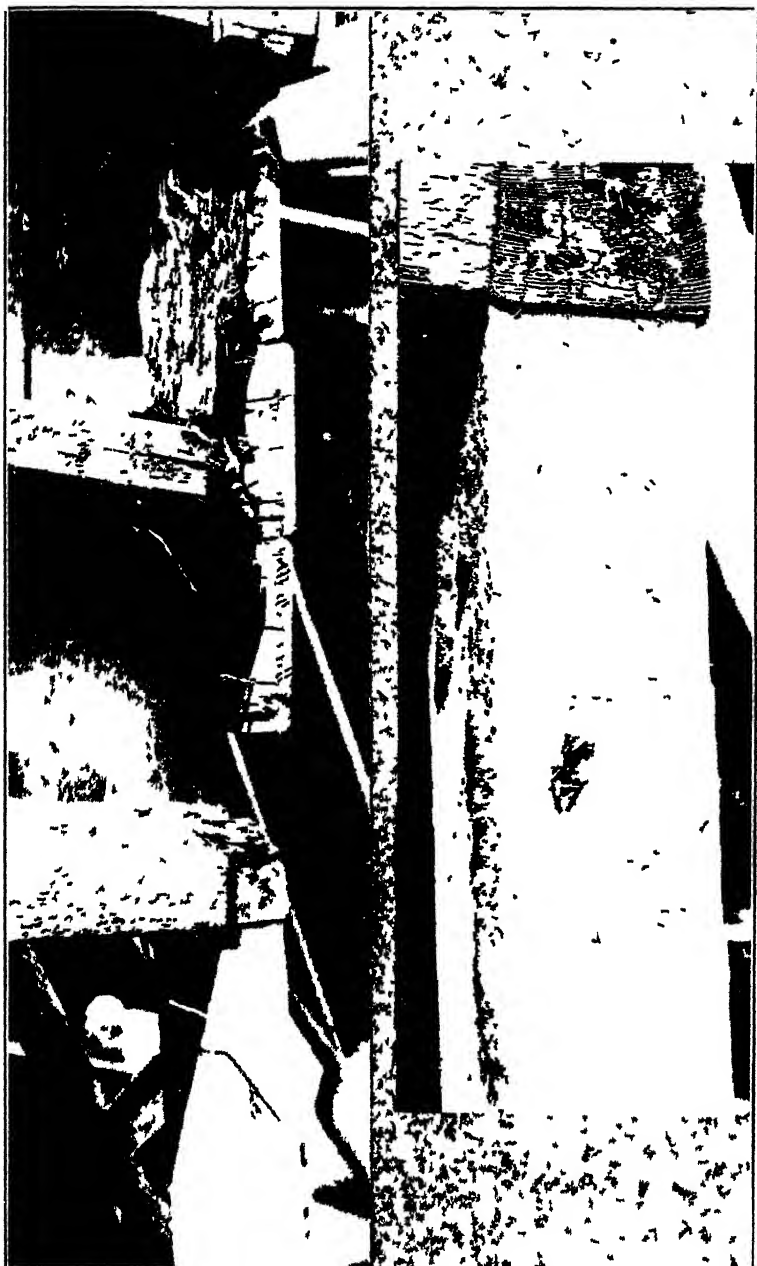
⁵ Proc. II. E. S. IV (2), p. 261.

which are usually of small diameter, and these as well as the entrance hole are often stopped with a parchment-like curtain. At a later period in the life of the colony the queen becomes enlarged by the distention of the abdomen with eggs and fat body and then the hard chitinous sclerites appear as narrow transverse plates on the dorsal and ventral surface of the white, soft, unchitinized integument. At seasonal periods, usually in the winter months, large numbers of nymphs are produced, and with the first warm spring weather, usually in May, these transform to adult winged individuals and swarm. The swarm usually occurs from dusk on into the night. Lighter swarming or individual emergence continues on through the summer. Occasionally a flying individual will be observed in mid-winter. Flights often occur after a rain. As previously related, the individuals engaged in the swarm are colonizing forms, adult males and females, which eventually cast their wings and settle down to the establishment of a new nest.

Habits of *Coptotermes intrudens*—typical of *Coptotermitinae*. The colonies of this species, while beginning as far as it is known in the usual way, ultimately become very large, the individuals numbering many thousands. Soldiers are very numerous and are peculiar in the possession of long sickle-shaped mandibles and a frontal gland, from which a white, acrid fluid is expelled when the insect is molested. The queen has never been observed.

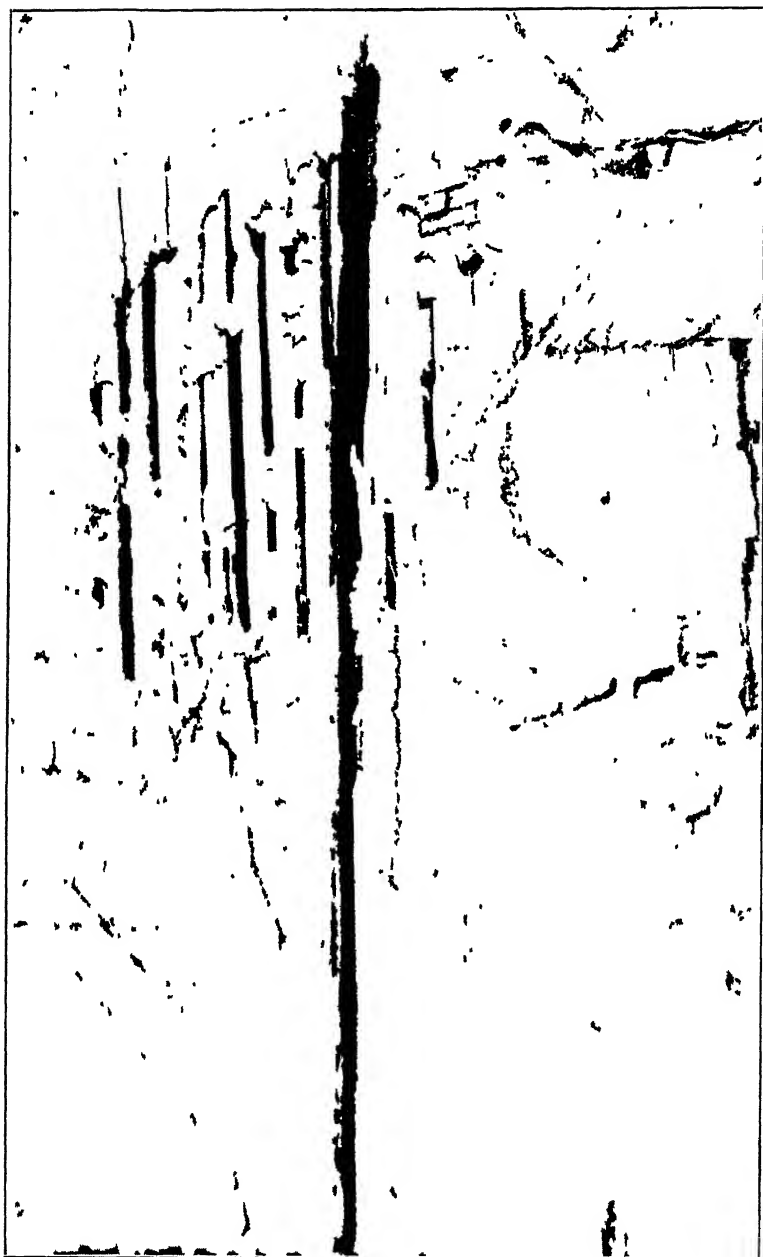
Unlike the species of *Kalotermitinae* referred to, this species cannot endure in dry wood. It appears to be very sensitive in respect to moisture conditions and a dry atmosphere if long continued is eventually fatal to it. It constructs its nests therefore in or near the ground, and as wood is consumed it is replaced by a mixture of earth, abdominal excreta and saliva. If forced to build the nest above ground soil is carried up into it and maintains the proper degree of humidity by absorption of moisture from the atmosphere. This species swarms at night in the spring of the year. An idea can then be gained of the vast numbers in their crowded nests, for they are on the wing about electric arc lights literally in clouds. Few of these individuals survive, however, as they are easy prey for ants. Those which do survive can usually be found later under fragments of wood where they attempt to start new colonies. A few eggs are laid in a hollow depression in the ground from which a beginning is made. Apparently eggs at first are not deposited continuously from day to day, but the initial lot hatch before a new batch is laid. The colony is built up very slowly but later when the egg laying capacity of the queen is developed to its full extent multiplication is effected rapidly, and the destructive capacity of the species is readily realized. The nests observed have not been of extraordinary size, never more than five cubic feet, I believe. The necessities of the growing colony in the way of fresh wood

PLATE III



Work of *Cryptotermes intrudens* Oshima. Runway constructed on supporting timber and leading from underground nest to framework of dwelling house in Honolulu. (Reduced)

PLATE IV.



Work of *Coptotermes intrudens*. Supporting timber of a large tenement in Honolulu, so badly damaged by termites that the structure collapsed during severe wind storm in December, 1918. (Reduced.)

are often met by the use of runways through the earth to new sources of supply. Long distances are often traversed in this way. Where circumstances force these foragers to the surface the runway is covered over with material like that used in constructing the nest.

DAMAGE DONE BY TERMITES.

Termites are notorious principally on account of their destruction of wood, but they are also known to damage paper and cloth. Recent experiments⁶ have definitely shown that they subsist entirely upon cellulose, which explains the peculiarities in their selection of food. Instances are recorded of their penetration of the hardest substances to obtain food and it is claimed that the milky, acid fluid secreted from the frontal gland by the soldiers of species of *Coptotermes* will dissolve lime mortar and lime concrete and enables them to work a passage through these materials.

The multiplication of species in the case of the termites and their restriction to definite environments, due as in the ants to a great measure of adaptability, has determined in a way the character of termite injury as far as Hawaiian species are concerned. For instance, the *Neotermes* is restricted to the forests and so far as known attacks only weakened or dying trees, the *Coptotermes* flourishes in moist situations, generally attacking wood in or near the ground. *Kalotermes* and *Cryptotermes* on the other hand cannot endure a great deal of moisture but can thrive on dry wood. They favor the woodwork and interior furnishings of houses.

The damage done by termites in Hawaii which has come to the writer's attention includes a wide range of subjects, as follows:

Frame buildings, railroad ties, construction timbers, wood furniture, service poles, stored lumber, books, wharf timbers, shooks, packing boxes, trees, shrubs, cotton cloth, crop plants.

METHODS OF CONTROL.

Natural or biological control. There is very little prospect of securing a practical and effective control of the termites present in Hawaii by natural agencies. At present we know of no internal parasites of these insects with the exception of certain protozoa which are found always and everywhere in association with termites, but are apparently not inimical, and are possibly beneficial. In this respect the termites resemble another very successful group of insects, the mosquitoes. Termites are also subject to the attack of mites and molds, or parasitic fungi. The latter are known occasionally to wipe out colonies entirely but neither can be said to exercise an effective control over ter-

mite activity. In the tropics where termite life reaches its highest expression some animals habitually depend upon termites for their sustenance and are peculiarly adapted to this means of livelihood. Birds like the swifts also find a ready and abundant supply of food in the great swarms of colonizing individuals emerging as a seasonal occurrence from the large nests which many tropical species form. But these agencies by which nature exerts a check on excessive multiplication of termites appear impractical for our purposes. In discussing the enemies of termites we must not overlook the ants, which are most persistent foes of termites and in the case of the aggressive carnivorous species make havoc in any termite nest to which they can gain access. They undoubtedly exercise a great check on the termites here particularly upon colonization but the vast numbers in which termites exist and the abundant supply of food together with the self-containment of their nests give a great advantage to the termites in the struggle for life.

Artificial control. Two courses are open to pursuit in attempting a control by artificial means, viz.: (1) The reduction of the termites by the destruction of their nests or termitaria. (2) Reduction of the termites by depriving them of their sustenance. The latter naturally would be an anticipatory or preventive measure as far as damage is concerned.

1. Destruction of nests or termitaria. Probably the best method of accomplishing this purpose is by fumigation with carbon bisulphide, hydrocyanic acid gas or the fumes derived from the burning of arsenic and sulphur. The location of the nest would be an important consideration in fumigation particularly as the gases require concentration to be effective. It is not believed that fumigation can be applied to the treatment of houses where the nests (of *Kaloterms* and *Cryptoterms*) are in the walls or supports, but articles of furniture can be effectively treated in a fumigatorium. If the house is attacked by *Coptotermes* the nest should be sought for treatment.

2. Anticipatory or preventive methods. These imply the suitability of termite-proof materials and the possibility of rendering materials termite-proof by treatment. The most recent and thorough investigations in this direction were made by Oshima in Formosa.⁶ His conclusion is that nothing except iron and stone is absolutely safe from the attacks of termites. He recommends the general substitution of concrete for wood and gives elaborate plans for the construction of termite-proof buildings. Numerous experiments were made to determine the degree to which different woods are termite-proof and the basis of their immunity. Only two woods were found to be entirely resistant, namely, the Australian cypress pine, *Callitris glauca*, and the Indian teak, *Tectona grandis*. Some Philippine woods

⁶ Oshima Phil. Jn. Sci. XV (4), 1919.

PLATE V



Work of *Coptotermes intrudens* Oshima Interior of damaged timbers exhibiting the replacement of cellulose by a composite of earth, abominal excreta and saliva with scarcely any tensile strength (Reduced)

PLATE VI.



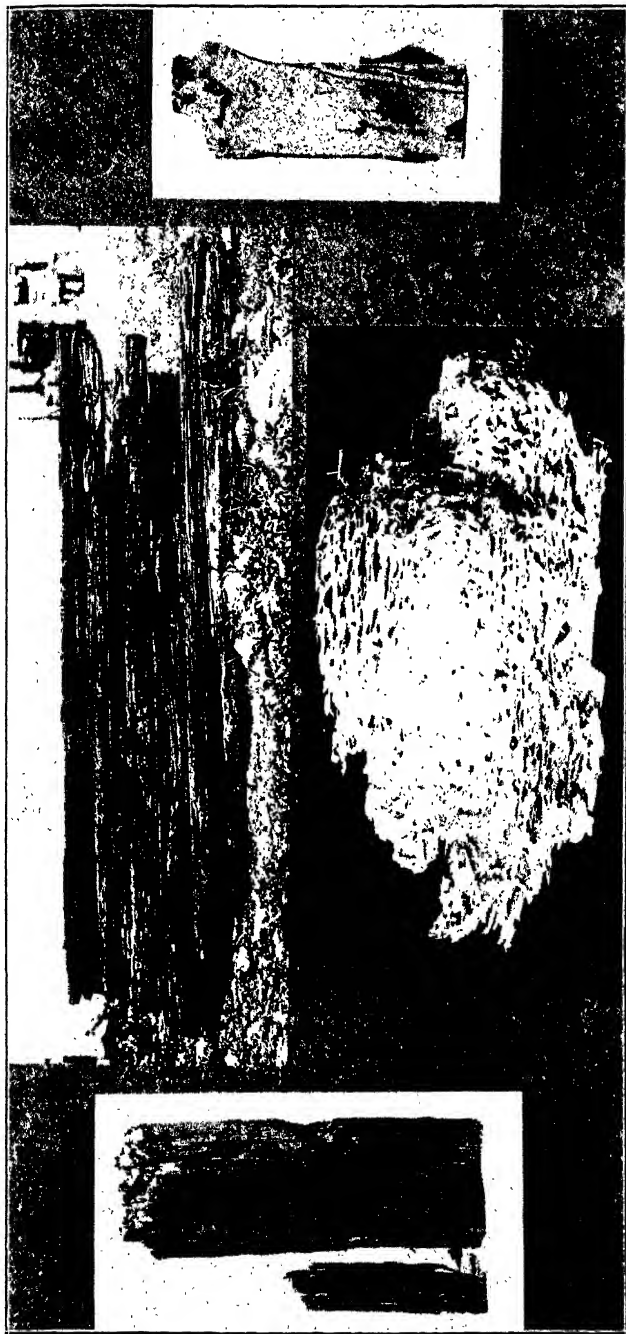
Work of *Coptotermes intrudens* Oshima. Upper left—Interior of damaged timber described in legend to Pl. IV. Upper right—Section of damaged timber showing hollow core. Lower left—Supporting column in former Capitol bandstand destroyed by termites. Lower right—Tele-

PLATE VII



Wool of *Cryptotermes intrudens* Oshima. Base of the tin lower pole
destroyed by termites.

PLATE VIII.



Work of the three lowland species of termites in Hawaii. Center—*Cryptotermes intrudens* Osolina, damaged railroad sleepers above, interior of damaged timber below. Left—*Kalotermeis* sp. referred to *marginalis*—damaged timber. Right—*Cryptotermes* sp. referred to *brevis*—damaged wood sample. (Reduced.)

PLATE IX

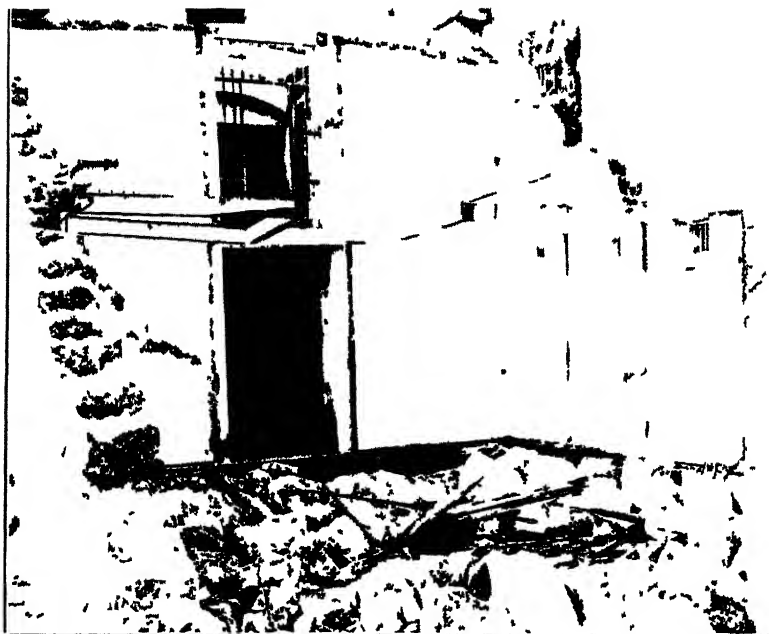


Fig. 1 Work of Kaloteimitnae Damaged timbers in former county jail Honolulu



Fig. 2 Work of Kaloteimitnae Damaged woodwork of dwelling house in Kikauko

PLATE X.



Fig. 1 Work of Kalotermitinae Damaged supports of dwelling house in Kakaako.

like ipil, *Intsia bijuga*, and molave, *Vitex parviflora*, showed a marked degree of resistance. The resistance was found to be due, not to hardness of the wood, but to *sesquiterpene*, an organic compound contained in the wood and readily extracted with benzine or alcohol. Camphor green oil was found to contain 25% of this alcohol and to be entirely satisfactory for the treatment of wood against termite attack. The anthracene oil fractionated from coal tar was also found to be a preventative. Where termite proof construction cannot be followed the thorough creosoting of footings and joints and the liberal use of paint on walls and roof undoubtedly afford a certain degree of protection against termite invasion. In some localities where termites are especially destructive baits with which arsenic is combined are always placed on the ground lot before a building is raised, to ward off termite attack.

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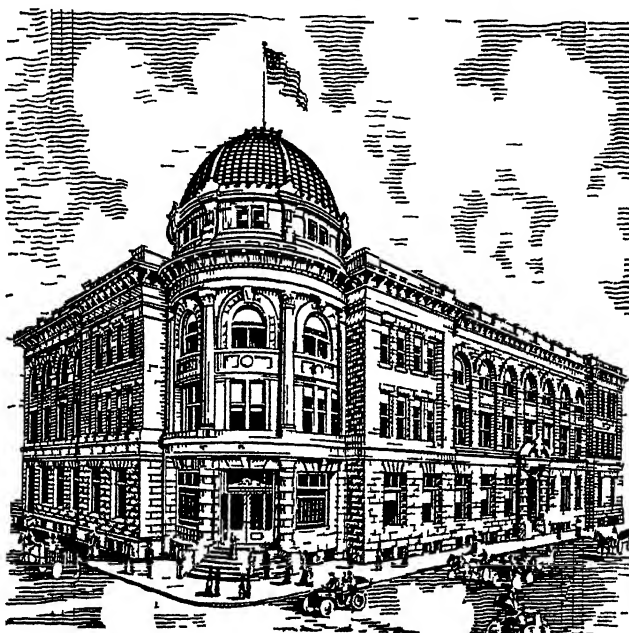
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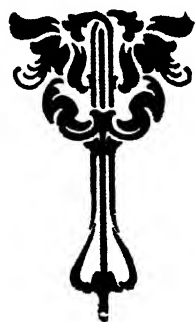
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Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, NOVEMBER, 1920.

No. 11

Announcement of the trees available for distribution at the Government Nursery for planting on Arbor Day, held this year on November 19, is contained in this issue.

The Board's exhibit at the Maui County Fair held at Kahului on October 21 to 23, 1920, and described in this issue, received very favorable comment from the many interested spectators who viewed it.

It will be of interest to dog importers to know that Rule VIII of the Division of Animal Industry relating to the quarantine on dogs has been amended and that by the use of the anti-rabic vaccine the period of quarantine has been reduced from 120 to approximately 40 days.

Progress is being made in the improvements at the Plant Inspection Station on Kekuanaoa Street, Honolulu. A new fumigation unit is being added to the present two, a green house for holding plants in quarantine is under construction, and a fence and gates soon to be erected will serve to keep off trespassers.

The reforestation work conducted for the past several years by the Waialua Agricultural Company on the mauka lands of Kawa-iloa, Oahu, whereby 800 acres of open land have been successfully covered with a new forest, is most commendable and well illustrates what can be accomplished by persistent efforts in tree planting.

DOG QUARANTINE REDUCED.

On November 6, 1920, the Governor approved the amendment to Rule VIII of the Division of Animal Industry, adopted by the Board on November 4, whereby dogs arriving in the Territory and coming from a country where rabies is known to exist may now be vaccinated against rabies and released after being held for thirty days for observation after the last injection.

This new procedure reduces the quarantine period from 120 days to about 40 days. The rabies vaccination may be applied to dogs a few days after their arrival, depending upon their condition of health. The treatment consists of six inoculations on six

consecutive days and causes little or no inconvenience to the patient. Since the treatment involves the use of an unattenuated virus the dogs are held for observation for 30 days after the last injection as a precaution. No cases have been recorded of dogs developing rabies as a result of this vaccination and it has been used with signal success during the past few years on thousands of animals bitten by rabid wolves and dogs in the United States.

The amended rule appears on the By Authority page in this issue.

C. S. J.

EXHIBIT AT THE MAUI COUNTY FAIR.

By CHAS. J. KRAEBEL,
Assistant Superintendent of Forestry.

The Board of Agriculture and Forestry was represented at the Maui County Fair this year on October 21 to 23, by a substantial exhibit, nearly one-fifth of the entire space in the Agricultural Building having been allotted to our use. The spirit of the exhibit was educational, with the idea of showing the various lines of work controlled by the Board.

The Divisions of Entomology and Plant Inspection combined their material in a display along twenty feet of table and wall space opposite the Forestry exhibit, which occupied the middle of the building. Arranged on the side table and suspended from the wall were trays of carefully mounted insects injurious to the various fruits and crops of Hawaii, along with other insects which are parasitic upon these pests. A series of hand-colored plates pictured some of the plant diseases which are kept out of Hawaii by rigid inspection of imported plants and seeds. Fifteen small cases of mounted leaf sections illustrated the kinds of damage done by scale insects to such plants as the pineapple, pigeon pea, coffee, croton and others. Of the large insect cases, one was devoted entirely to sweet potato insects, showing the weevils, leaf roller, sphinx moth and cut-worms which infest that important food plant. A case of "agricultural insects" contained fern and mango weevils, powder post beetles, coconut leaf roller and the malicious Koa pod borer. This Koa insect destroys annually probably ninety per cent of the Koa seed crop, thus making it both difficult and costly for the Forest Nurseryman to get enough seed for reforestation purposes. Fruit flies, melon fly, leaf hoppers, cotton, corn, potato and bean insects, plant lice and dung flies—all were displayed in neat cases carefully labelled, and with each of these destructive pests was shown the insect or insects which have been found to be predaceous upon that particular pest. Considerable interest was shown by many visitors in these parasitic insects and in the explanations of the work of parasitic propagation carried on by the Division of Entomology. The im-



EXHIBIT AT THE MAUI COUNTY FAIR, OCTOBER 21 23, 1920

portance of these predatory insects was emphasized because it is their predaceous activities which make tropical agriculture possible by preventing the increase, to epidemic numbers, of serious insect pests. Several collections of miscellaneous insects served to fascinate the curious with their contents of giant grass-hoppers, weird "walking sticks," and huge rhinoceros beetles. Many a shuddering gazer at these ugly creatures learned for the first time that it is only by constant vigilance on the part of the Territorial inspectors that such pests are kept out of the Hawaiian Islands.

The Division of Forestry in its exhibit also emphasized the educational features. One-half of its allotted space was occupied by a large table, 8 by 16 feet in size, covered with growing trees. The table was built up pyramid-fashion by steps and on these were placed flats of young seedlings and small trees in green-painted pots, making altogether a cool refreshing spot in the general heat and hubub of the Fair. Nearly every species of the trees used in reforestation work was represented, but there were also many ornamental and shade trees such as the showers, monkeypods, false kamani, various palms, banyans and others. One side of the table displayed several choice varieties of Eucalyptus in seedling flats and pots. From the center of the table rose a signboard in the shape of a Japanese torii with posters explaining on one side the processes of growth in a tree, and on the other carrying the following announcement:

THESE TREES

Were raised at the Haiku Nursery at Haiku, Maui. This nursery is now operated by the Board of Agriculture and Forestry for the benefit of the people of Maui and Molokai. Forest Ranger James Lindsay is in charge and will furnish any quantity of trees for forest or ornamental planting, at cost. Next month, on Arbor Day, trees will be given free to all who want them. Get busy and *plant a tree; plant hundreds* of them! They grow while you sleep and your children's children will bless your name.

Opposite the tree table there was constructed an "erosion model" such as has been shown several times in Honolulu but which had never before been exhibited on Maui. This miniature illustration of the disastrous effects of deforestation proved of absorbing interest to many adults as well as to the hundreds of school children who paused to study it on Friday, which was set apart as children's day. The model was six feet square, and was built to slope gently forward at a convenient height. The left half of the box showed a tree-clad mossy mountain drenched by a steady spray of water which trickled by little rivulets from the base of the mountain, formed a miniature winding river, and ultimately found its way into a small clear lake. On the right a barren mountain of red earth, although "rained" upon by a spray

of the same strength as that on the forested hill, was deeply guillied on all its sides, its drainage river flowed in a deep gorge or spread out over boulder-strewn flats and built a broad delta in a very muddy lake. To emphasize the contrast, two gold fish were placed in the clear lake but these proved so distracting from the main purpose of the model that they had to be removed. Behind the mountains a poster enumerated the various advantages of forests and the disadvantages of barren slopes.

Flanking the erosion exhibit were placed three racks containing a total of ninety sawed samples of native and introduced woods which are part of the permanent forestry exhibit in the Honolulu office. A printed label on each board gave its scientific and English or vernacular names. A surprising amount of interest was shown in these samples, particularly by men and by native Hawaiians. These latter spent much time spelling out the native names and turning the boards to compare the finished and natural faces, seeing for the first time the grain of woods which they had known all their lives only as trees in the forest.

During the three days of the Fair several thousand packages of Congressional garden seeds were distributed to the citizens and school children of Maui. In the opinion of the agricultural judges the exhibits of the Board of Agriculture and Forestry were both instructive and attractive, and in recognition of this three "special premium" ribbons were awarded the display.

FORMOSAN TERMITES AND METHODS OF PREVENTING THEIR DAMAGE.*

By MASAMITSU OSHIMA

Of the Institute of Science, Government of Formosa

INTRODUCTION

One of the most serious problems in the Tropics with regard to man's industry is to discover a method of preventing the damage caused by termites. Because of their subterranean habits and insidious methods of attack, termites are very difficult to destroy. Moreover, as stated by Dr. K. Escherich:¹ "Nichts ist vor ihren Kiefern und zerstörenden Sekreten sicher ausser Eisen und Stein." (Nothing is safe from their jaws and destructive secretions except iron and stone). Such being the case, not only is the extermination of these insects almost impossible, but also preventive measures against their damage are difficult to apply.

Fortunately, Japan is located in a temperate region; and, therefore, her people have not been obliged to pay attention to these

¹*Die Termiten* (1909)

*Philippine Journal of Science, Vol. XV, No. 4.

formidable pests. However, one species, *Leucotermes speratus* Kolbe, which very often causes somewhat serious damage to wooden structures, has been recorded in Japan since 1724. About



EROSION MODEL OF FORESTRY EXHIBIT, MAUI COUNTY FAIR

twenty years ago, Japan occupied Formosa, which lies in a semi-tropical region; that is, in the western Pacific Ocean, between the southern and eastern China Seas. In this possession the people have been compelled to fight against the common pest of the Tropics, and the investigation of the biology of termites has become one of the most important problems of the architect and the entomologist.

In Formosa and in Japan there are fourteen species of termites, four of which, namely *Coptotermes formosanus*, *Leucotermes speratus*, *Leucotermes flaviceps*, and *Odontotermes formosanus*, are known as pests of wooden structures. *Coptotermes formosanus*, which is distributed in Formosa, Riu Kiu Islands, and in the southern parts of Japan proper, is especially formidable to buildings. It is certain that the other three attack woodwork, and wooden structures as well, but their ravages are negligible in comparison with those of *Coptotermes formosanus*.

During the last ten years, I have been investigating the Japanese termites, especially the habits of *Coptotermes formosanus*. I approached the problem of the method for prevention with the following ideas as a working basis:

1. Some changes are necessary with regard to the construction of buildings in the Tropics in order to prevent damage by termites.
2. The value of termite-proof building construction is not absolute, unless all sorts of nonresistant timbers are eliminated from the building materials.
3. If it shall be proved that the elimination of nonresistant timbers is practically impossible, it becomes necessary to treat them chemically or physically in order to confer a special resistant property.
4. It is necessary to prove whether or not there are naturally resistant timbers in the Tropics.
5. If there are naturally resistant timbers, an investigation with the object of discovering the cause of resistance becomes important.
6. If the causes are definitely known, methods of artificially treating nonresistant timbers will be more easily discovered.

CERTAIN HABITS OF COPTOTERMES FORMOSANUS SHIRAKI

DIFFERENT CASTES IN THE COLONY

Generally the members of a termite colony differ greatly at different times of the year. Eggs and newly hatched larvæ of *Coptotermes formosanus* are most numerous in the summer; winged forms and nymphs are not present after the swarming season (from the end of May to the beginning of June); nymphs increase in number in the spring, becoming most abundant in April; at the end of May the nymph changes to an imago and usually swarms during the first ten days of June. A complete colony contains the following castes:

1. Newly hatched larvæ. The heads of all are alike in dimensions and provided with 10-jointed antennæ.

2. Larvae of soldier, derived from 1. Distinctly differs from the other castes in having somewhat elongate, toothless mandibles and suborbicular head.
3. Larvae of worker, derived from 1. Large-headed and provided with clearly denticulated mandibles, the tip and the inner margin of which are more or less brown.
4. Larvae of royal form, derived from 1. Small-headed; other external characters are similar to those of worker larvae.
5. Nymph of royal form. The members of this caste are provided with two pairs of wing pads and one pair of nonpigmented eyes and ocelli; body milk white.
6. Winged forms with pigmented eyes. Body reddish brown. At the beginning of May vast numbers of this caste are found in the nests; they emerge from the old nest early in June.
7. A single queen, derived from a female of the winged form. Abdomen greatly enlarged, with two pairs of triangular wing stumps on the thorax.
8. A single king, derived from a male of the winged form. Abdomen normal, with two pairs of triangular wing stumps on the thorax.
9. Substitute royal forms. It is certain that there are several kings and queens belonging to this class; however, the substitute king is not known. The substitute queen which was collected in Kiushiu by Mr. Tatsuo Yoneyama, engineer of the Imperial Railway, is 12 millimeters long; head yellow, abdomen milk white, thorax with no wing stumps. This caste is very rare in the colony of *Coptotermes formosanus*. According to Yoneyama's information, the nest which contained this queen was orphaned and some fifteen of the same form were captured at the same time.

THE FOUNDATION OF A NEW COLONY

In Formosa the swarming of *Coptotermes formosanus* takes place at the end of May or early in June, while in Japan proper the winged individuals swarm a little later; that is, at the end of June.

After the adults have rapidly emerged from the parent nest in a vast swarm and have flown a short distance in an irregular, wobbly manner, they fall to the ground. As soon as they reach the ground, they cast the wings. Then the male is attracted to the female and follows her tirelessly and closely, performing the so-called "Termiten Liebes-Spaziergang." In this manner the imagoes separate into pairs and enter hiding places in order to establish new colonies, usually under pieces of decaying wood, in holes and crevices in wood, or directly in the earth.

In order to observe the starting of a new colony, many new couples were captured in glass tubes.

The bottom of a test tube, 2 by 16 centimeters, is bored with a capillary pore, and a piece of absorbent cotton is inserted. Then a proper quantity of crushed clay is placed in the tube to serve as the abode of the future colony; upon this layer pieces of soft wood or cotton are laid for food. A male and a female that have recently flown from the nest are now placed in the tube, which is tightly corked and put in a dark place.

In order to keep captive termites in a healthy condition, it is absolutely necessary to give them proper humidity. This is done

by placing the end of the tube in water, thus allowing the absorbent cotton to draw a sufficient amount of water through the pore. As a result of these investigations, the following facts were determined:

1. During the first stage of colonization both the male and the female are active. They forage for themselves and are equally important in establishing the new colony and in rearing the first brood of young.
2. Egg laying in a newly established colony begins from five to thirteen days after the swarming.
3. The rate of egg laying is not rapid in the first batch, one to four eggs being laid on one day.
4. Eggs hatch out in from twenty-four to thirty-two days after they are laid.
5. After five months of captivity, the nests in two of the tubes were opened. In these there were no unhatched eggs; the king and the queen, which still retained the normal form of the imago, ran actively, in company with rather small individuals of the worker type and soldiers. The number of individuals in each nest agreed well; one contained twenty-two individuals of the worker type and two soldiers, the other, twenty individuals of the worker type and three soldiers. These facts clearly show that about twenty-five eggs compose the first batch in a newly established colony, and that no more eggs are laid until the eggs of the first brood are all hatched.
6. In the first brood the soldiers are few in comparison with individuals of the worker type, about 10 per cent of the number of the latter being soldiers.
7. Soldiers hatch from the eggs that are laid by true royal females.²

SITUATION OF THE NEST

Coptotermes formosanus does not construct a large mound as do some species in the Tropics. Usually it makes its nest in the ground at a depth of from 6 to 10 feet (1.82 to 3.04 meters). Very often the nest is made at the junction of rafters of buildings or in the inner part of infested timbers, in wooden boxes or cabinets, or in the interspaces in walls. Generally the nest is round and honeycombed, and in the center there is a small, slitlike royal chamber.

The nest consists of a mixture of abdominal excreta and clay or sand, pasted together with a special secretion of the salivary glands. Sometimes it is rigid and compact and seems like a piece of rock. However, it is inflammable and burns rapidly, leaving a small amount of ash.

²As it is almost impossible from external characters to draw a fast line between larvae of royal forms and of workers, nothing at present can be said with regard to the origin of these two forms.

DAMAGE TO BUILDINGS AND OTHER MATERIALS

Coptotermes formosanus is essentially a wood destroyer and attacks very seriously all sorts of woodwork and wooden structures. Because of its habit of attacking Japanese pine, which is an important building material, it is classed as a most formidable pest throughout Formosa. Moreover, as the method of attack

of this insect is insidious, usually leaving the outer layer of wood intact as a protective covering from sunlight and its natural enemies, so that the damage is always hidden until beyond repair, it is a most dangerous enemy to buildings.

In infesting buildings it generally gains entrance from outdoor colonies. By means of subterranean tunnels of considerable length, which originate from a nest in the ground, it reaches the foundation of a building. At first it attacks foundation timbers, flooring, or supports of porches or steps that are in contact with the ground, and gradually extends its tunnels and excavation into the first, the second, or even the third floor and into the roof, passing through the walls or the interior of timbers.

In cases where the foundation is of stone, concrete, or other impermeable material, it constructs a covered tunnel of a mixture of earth and saliva over the surface and reaches the woodwork. Generally a cross section of this artificial tunnel is semicircular, the diameter being from 5 to 10 millimeters.

Damage to buildings.—Ordinary Japanese houses are chiefly constructed of wood and clay, the foundation timbers being laid in contact with the ground. Thus the construction itself is not fitted to prevent the attack of termites. Moreover, Japanese pine and cryptomeria, which are most liable to be attacked by *Coptotermes formosanus*, are the principal building materials. Such being the case, the Japanese people suffer a great deal from the damage when they erect buildings of their own style in Formosa.

As the work of *Coptotermes formosanus* is hidden, it is difficult to detect the presence of the insects or the damage that they are doing. After they have caused the fall of a building, the beams, the rafters, and other important parts of the woodwork are often found to be mere shells, the interior being entirely honey-combed.

Damage to brick walls.—There are several records in Formosa of modern brick buildings having been infested by *Coptotermes formosanus*. It is absolutely impossible for it to attack brick itself; but, according to my actual observation, the mortar which is used as a cementing material for bricks is subject to attack.

In building a thick brick wall the following method is adopted: The face bricks are laid upon a bed of mortar; the mortar, in a semifluid condition, is then poured into the space between the face bricks; the bricks are then pushed rapidly, horizontally for a short distance, into their position; a certain amount of the mortar is thus displaced; this rises in the side joints and completely fills all the interstices; should the mortar not rise to the top of the joints, the vacant spaces are filled up, when the next course is larried.

All the interstices between the bricks would be completely filled, if the bedding could be carried on theoretically; but this is practically impossible, so that there are almost sure to be voids in brick walls. Under such conditions, termites prefer to pass

through brick walls, if they have a chance to permeate them, rather than to excavate ordinary walls; because the voids are always in a favorable condition for their life, being protected from the sunlight and containing a proper amount of moisture.

There are two kinds of mortar used for constructional work; namely, cement mortar and lime mortar. The former is composed of sand and Portland cement (the ratio of Portland cement to sand is from one to two to one to four), while the latter is composed of moderately hydraulic lime and sand (the ratio of lime to sand is usually one to two).

In Formosa until a comparatively recent date lime mortar was exclusively used for the bedding of bricks. It has been found, however, that *Coptotermes formosanus* easily penetrates brick buildings and causes serious damage. Since the Government has required the use of cement mortar instead of lime mortar there has been no record of damage to brick walls. Therefore, it seems reasonable to conclude that there exists some special relationship between lime and the destructive power of *Coptotermes formosanus*.

The soldier of *Coptotermes formosanus* is provided with a special gland on the forehead, which secretes a milky, acidulous fluid; its excreta and saliva are also acidulous, while those of the worker are alkaline. In the passages perforating the lime mortar of brick walls vast numbers of soldiers are found. Such being the case, it is said that the soldier of *Coptotermes formosanus* attacks lime mortar by dissolving the lime with the acidulous secretions.

Damage to railway sleepers.—*Coptotermes formosanus* attacks railway sleepers as well as buildings. According to a statement of the Bureau of the Formosan Government Railway, the life of an untreated, chestnut sleeper is only two years in Formosa, while in Japan proper it is from eight to ten years.

In the southern part of Formosa another species of termite, *Odontotermes formosanus*, also attacks the sleepers.

The damage it causes is rather more serious than that caused by *Coptotermes formosanus*. Therefore, in the case of sleepers, it is important to prevent the damage caused by these two species. Usually the length of the spike which is used to fix the rail to a sleeper is a little greater than the depth of the latter, so that its tip always penetrates beyond the bottom of the sleeper, causing some damage to that surface. This point is most liable to be attacked. As the pests excavate the wooden tissue surrounding the spike, the latter becomes ineffective. Suppose such damage occurs successively in several sleepers; the results are quite obvious—the rails spread and cause great danger to passing trains.

Damage to ships.—One can hardly believe that steamships and launches in the water have been attacked by *Coptotermes formosanus*; but it is an undeniable fact. There are many records of such cases in the harbor of Keelung, Formosa. It happens in this way. In the swarming season, many thousands of winged

males and females start from the nests in the vicinity of the shore. Some of them have a chance to fly into the ships moored in the harbor and there start new colonies. The interior of the ship is dark enough to favor the establishment of a nest. Usually the bottom of the ship is constructed of Japanese pine, which is most durable in water; all the timbers contain a favorable amount of water. Thus, all conditions being exceedingly favorable to *Coptotermes formosanus*, the ravages are extended step by step, until the vessel becomes unseaworthy, because of the unexpected destruction of important parts of the woodwork. In such a case extermination of the pests is very difficult. When the Government trawler *Ryokai-maru* was found to be infested, it was purposely sunk in the sea in order to destroy the insects.

Besides the above-mentioned damage, that done to bridges, telegraph poles, books, paper, wood pulp, cotton, and clothing is sometimes very serious.

PRINCIPAL FOOD OF COPTOTERMES FORMOSANUS

The stem of an exogenous perennial is a complex of structural elements of varied form and function. Of these we may distinguish three main groups: *a*, vessels; *b*, wood cells proper; *c*, medullary tissue. The growing cell of plant tissue consists of cell wall and protoplasm, the living functions depending upon the activity of the latter. However, the above-named three main structural elements of the wood do not contain nitrogenous substance—that is, protoplasm—but mainly consist of the special constituent of the cell wall known as cellulose.

There are, as might be expected, a great many varieties of cellulose, and the term must be taken as denoting a chemical group. Cellulose, taken as a group, presents the following characteristic: A colorless substance, insoluble in all simple solvents; generally but variously resistant to oxidation and hydrolysis; nonnitrogenous, having the empirical constitution characteristic of the carbohydrates. The composition of pure cellulose is represented by the percentage numbers C 44.2, H 6.3, O 49.5, corresponding to the empirical formula $(C_6H_{10}O_5)_x$. It is flexible, slightly elastic, permeable, but only slightly absorbent, and does not readily undergo fermentation. When treated with acid it passes into a starchlike condition, as is evidenced by its turning blue with iodine; and under certain conditions in the living plant it would seem capable of being formed from sugar or of passing into it.

It must be noted, however, that the typical cellulose is not separated from the plant in a pure state, but in admixture or in intimate chemical union with other compounds or groups of compounds. The latter are distinguished by greater reactivity; for example, they readily yield to alkaline hydrolysis, to oxidation, or to the action of the halogens. In the latter is included the very important group of lignified cellulose, or lignocellulose,

distinguished by the presence of ketohexene groups in union with the cellulose, and therefore combining directly with the halogens.

Generally, walls of cellulose, fibres, and vessels in the wood acquire mechanical strength or resistance by undergoing a change known as lignification. This consists in their impregnation with a substance known as lignin, forming a compound cellulose, namely, lignocellulose. Lignin, like cellulose, consists of three elements—carbon, hydrogen, and oxygen—but in different proportions, its percentage composition being C 49, H 6, O 44. Its chemical constitution is as yet unknown. It is harder and more elastic than cellulose, readily permeable by water, but not absorbent. It is more soluble in acids than is cellulose and is recognized by turning deep magenta when treated with phloroglucinol in hydrochloric acid.

As shown in the preceding pages, *Coptotermes formosanus* seriously injures all sorts of woodwork and wood products. However, why it attacks such materials or, in other words, what was the principal food of *Coptotermes formosanus* contained in wood was quite unknown. In order to settle this question the following experiments were made:

Experiment 1.—A living worker or soldier of *Coptotermes formosanus* was placed on a microscope slide, and the tip of its abdomen was pressed, the excrement being thus discharged. This was treated with phloroglucinol in hydrochloric acid under a cover glass. The color changed to deep magenta, showing the characteristic reaction of lignin.

Experiment 2.—A piece of the nest was treated with the same reagent. It also gave a deep magenta coloration, characteristic of lignin.

Experiment 3.—A piece of camphor wood and a nest of *Coptotermes formosanus* made from camphor wood were analyzed.

It is quite obvious that the amount of cellulose is the main difference between the constituents of the camphor wood and those of the nest. As there occurs no decrease of noncellulose, it is clear that cellulose has been taken as the food when the camphor wood passed through the alimentary canal; and non-cellulose, that is, lignin, which is produced as a decomposed material of lignocellulose by the special function of the alimentary canal, is discharged as the building material of the nest.

(To Be Continued.)

DIVISION OF FORESTRY.

REPORT OF SUPERINTENDENT OF FORESTRY, OCTOBER, 1920.

Honolulu, November 13, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of October, 1920:

FOREST FENCING

Soon after my return from extended leave on October 26, attention was given to closing up two gaps in fences on forest reserve boundaries where it is important to keep out cattle. One of them, at the end of the fence between Waika and Kawaihae I in the Kohala Mt. Forest Reserve, Hawaii, consists of a stretch of about 1000 feet at the edge of Honokane Gulch and Ranger Harry L. Denison has been requested to arrange for the necessary construction. The other consists of an uncompleted gap about half a mile in length on the mauka boundary of the Kula Forest Reserve, Maui, between Kanahau and Kalepeamoa at the end of the fence constructed last fall in cooperation with the Raymond Ranch. The wire for this gap was sent up to Maui some time ago but since the Raymond Ranch has found it impossible to erect the fence, efforts are being made to have it constructed by the Kaonoulu Ranch.

Ranger Mackenzie on Hawaii reports that the fence being built by Y. Tanaka in cooperation with this Division to protect the forest along the Volcano road in Oloa between 19 and 22 miles on Hawaii is nearing completion. This fence is approximately 2.5 miles in length.

FOREST PLANTING

As will be seen by the Forest Nurseryman's report, tree planting has continued on three areas on Oahu, viz. Makiki, Lualualei and Waiahole, a total of 1,252 trees being set out. These consisted of koa, Johore figs, Australian red cedar, Norfolk Island pine, kauri pine, and Japanese cedar. The main attention of the planting crews was given during the month to weeding trees already planted.

CATTLE TRESPASS

The District Forester at Waianae, Oahu, on October 28, reported the trespass of 25 head of tame cattle on the Waianaekai Forest Reserve. These he had removed from the reserve but since this is a repetition of what had previously occurred, in spite of warnings to the contrary, the matter was at once referred to the Attorney General with the request that, if the evidence was sufficient, he proceed against the owner for violation of Rule II, which forbids the grazing of cattle in forest reserves. The Attorney General has doubts as to the sufficiency of the evidence but still has the matter under consideration.

In this connection the law concerning the powers of this Board to rid the reserves of cattle is being studied with the view of improving it at the next regular session of the Legislature.

MAUI COUNTY FAIR

The Division was represented at the Maui County Fair held at Kahului on October 21-23, by an exhibit of trees grown at the Haiku Nursery, by charts, and by the working erosion model showing the beneficial effects of a forest cover on the runoff.

FOREST PROTECTION

Several conferences were held with Dr. Lyon of the H. S. P. A. on forest protection matters mainly in connection with the Hilo and Kohala Mts. Forest Reserves.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF THE ASSISTANT SUPERINTENDENT OF FORESTRY, OCTOBER, 1920.

Honolulu, November 13, 1920.

Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—The following statement of my activities during the month of October is respectfully submitted:

The first ten days of the month were taken up with matters relating to my September trip on Maui, such as legending for permanent record the photographic negatives made during the trip and making a general study of the history of the several reserves from material in the files.

With regard to the dying forest in the Koolau Reserve, Maui, I read all the published articles and reports on this matter and had an interview with Dr. Lyon concerning his studies in the field. Because of the absolute dependence of the large sugar plantations on central Maui upon the water drawn by the Big Ditch system from the water conserving forest, the Planters' Experiment Station is planning extensive experiments to find exotic trees which will thrive in localities where the native species are dying. Efforts will concentrate largely upon the genus *Ficus* and upon the introduction into Hawaii of the insects necessary to the fertilization of the seed of that genus so that it may spread by natural reproduction. It is altogether logical that this serious forestry problem be attacked by the interests which will be most directly benefitted by its solution, particularly so in view of the fact that the appropriations of the Division of Forestry are at present inadequate to undertake the work on so large a scale.

Following this several days were spent in assembling material, making posters, etc. for the forestry exhibit at the Maui County Fair. I left for Maui on October 18, and returned to Honolulu on October 28, the extra days before and after the Fair being needed to assemble and disassemble the exhibit. A brief illustrated article has been prepared for the "Forester and Agriculturist" giving a detailed description of the exhibit.

Respectfully submitted,

C. J. KRAEBEL,
Assistant Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN, OCTOBER, 1920.

Honolulu, November 24, 1920.

Superintendent of Forestry, Honolulu.

Dear Sir:—I herewith submit a report of the work done during the month of October:

NURSERY

Distributions of Plants—

	In Seed	In Trans- plant	Pot	
	Boxes	Boxes	Grown	Total
Sold		150	51	201
Gratis (including forest reserves)	5,000	....	613	5,613
Total	5,000	150	664	5,814

COLLECTIONS

Government Realizations—

Collection on account of plants sold	\$ 2.20
Plants sold at Kalaheo Nursery, Kauai (Joe Rita, Jr.).....	12.125
Rent of office, Nursery grounds, for September	35.00
Total	<u>\$49.45</u>

Animal Industry Revolving Fund—

Dr A. R. Glaisyer (Anti Rabie Vaccine)	\$ 6.00
--	---------

MAKIKI STATION

The work at this station has been principally routine. We have a large supply of plants on hand for the coming planting season.

HONOLULU WATERSHED

The work done on the watershed consisted of clearing trails, clearing brush, etc., away from the trees and preparing ground for planting. Eighty koa trees were planted.

HILO SUB-NURSERY

Bro. M. Newell reports the distribution of 296 trees in transplant boxes.

HAIKU SUB-NURSERY

Mr. James Lindsay states in his report that he distributed 855 trees in transplant boxes and 83 pot-grown plants. Total 938.

KALAHEO SUB-NURSERY

Joe Rita, Jr., gives the number of trees distributed as 500 in tins.

LUALUALEI, WAIANAE

J. K. Luka reports the planting of trees for October as follows:

Ficus Johore	432
Cedrela Australis	520
Total	<u>952</u>

WAIAHOLE FOREST RESERVE

Alfred Rocha, in his report for October, gives the trees planted as follows:

Australian Red Cedar	150
Kauri Pine	30
Norfolk Island Pine	20
Japanese Cedar	20
Total	<u>220</u>

ADVICE AND ASSISTANCE

The writer at the request of Mr. Wm. Harpham paid a visit and spent one day in examining the forest work that is being carried on by the Waialua Agricultural Company. This company has now about 800 acres in planted forest. In addition to a large number of eucalyptus, groves of grevilleas, Australian red cedar, Sugi (Japanese Cedar), Casuarina—two species (Ironwood), Cypress, etc., are to be found in a flourishing condition. A well-stocked nursery, containing many thousands of trees, consisting principally of Australian red cedar, Kauri gum tree, Sugi (Japanese Cedar), Macadamia nut and a number of Eucalyptus, is to be found at Mr. Harpham's home at Kawailoa. The work done in this

line is certainly very creditable and will undoubtedly prove of great value to the company in years to come. The careful and able work done by Mr. Harpham is very commendable.

The writer spent four days on Maui during the Fair, and assisted in judging the flowers and plants and doing other work in connection with the Forestry exhibit. The nursery at Haiku was visited and found in excellent shape.

Six visits were made during the month to render advice and assistance to various places in and around the city and eight people calling at the nursery also received assistance. Requests are also on file to call at the following places: Fort Kamehameha, Pearl Harbor Hospital, Submarine Base at Pearl Harbor, Fort Shafter and the Arsenal.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

REPORT OF THE ENTOMOLOGIST, OCTOBER, 1920.

Honolulu, November 24, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—During the month of October the insectary handled 24,200 pupae of the melon fly from which there were bred 5053 females and 4360 males (*Opus fletcheri*.)

The distribution of parasites was as follows:

MELON FLY PARASITE

	<i>Opus fletcheri</i>	Females.	Males.
Oahu:			
Moiliili	1250	1150	
Kalihi	200	200	
Kapahulu	300	300	
Moanalua	300	300	

FRUIT FLY PARASITES

	<i>Opus humilis</i>		
Oahu:			
Kalihi	50	50	
	<i>Dirhinus giffardi</i>		
Oahu:			
Nuuanu Ave.			900
	<i>Diachasma fullawayi</i> .		
Oahu:			
Kalihi	300	300	
	<i>Tetrastichus giffardianus</i> .		
Oahu:			
Kalihi			300
	<i>Diachasma tryoni</i> .		
Oahu:			
Kalihi Valley	300	300	

Galesus silvestri.

Oahu:
Nuuanu Ave. 1120

DUNG FLY PARASITE

Spalangia cameroni.

Oahu:
Moanalua 1600

Respectfully submitted,

D. T. FULLAWAY,
Entomologist.

DIVISION OF PLANT INSPECTION.

REPORT OF THE CHIEF PLANT INSPECTOR, OCTOBER, 1920.

Honolulu, October 30, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of October, 1920, as follows:

During the month 64 steamers arrived at the Port of Honolulu, 24 of which carried vegetable matter and 12 vessels came through the Canal Zone. The following disposal was made of the various shipments:

Passed on free as from pests	1232 lots	37,282 pkgs.
Fumigated	5 "	5 "
Burned	70 "	70 "
Returned	1 "	1 "
Total inspected	1308 lots	37,358 pkgs.

Of these shipments 37,062 packages arrived as freight, 163 packages as baggage and 133 packages as mail.

RICE AND BEAN SHIPMENTS

During the month 21,219 bags of rice from Japan, 80 matts of rice from China and 2794 bags of beans from Japan arrived clean.

PESTS INTERCEPTED

Approximately 5137 pieces of baggage belonging to immigrants from foreign countries were examined, from which 36 lots of vegetables and 28 lots of fruit were seized and destroyed.

On October 1 a package of corn and a plant in the baggage of passengers from Japan were seized and destroyed.

On October 5 a Java Sparrow arriving from the coast for Mr. S. Stephenson was killed with HCN, it being prohibited.

On October 6 a package of barley from Japan in the mail was seized and destroyed as contraband. A package of pea seeds, also in the mail from Japan was fumigated on account of weevils.

On October 13 a package of seeds in the mail from Japan was fumigated on account of weevils.

On October 18, per Santa Cruz, a package of herbs containing rice paddy was found in the mail from Manila. The rice paddy was burned also wrapper of cocoanut leaves, showing disease was destroyed. On

the same date, per Meiyo Maru, a package of Betel nuts, in the mail from Manila was fumigated, being infested with lepidopterous larvae.

On October 20 a lot of corn and a plant in the baggage of a passenger from Japan was seized and burned. A package of paddy rice from Manila in the mail was burned; a package of beans in the mail from Japan was fumigated precautionary; a package of nuts in the Manila mail was fumigated on account of weevils.

On October 22 a package of Daffodil bulbs was found in the mail from California. Upon inspection two of the bulbs were found infested with the Bulb-fly (*Merodon equestris*). These were burned and the rest fumigated and passed.

HILO INSPECTION

Bro. Newell, inspector at Hilo, reports the arrival of 9 steamers at Hilo. Seven carried vegetable matter consisting of 301 lots and 6985 parcels, all clean; 5033 bags rice and 493 bags beans arrived from Japan and were passed.

KAHULUI INSPECTION

Mr. L. Gillin, inspector at Kahului, reports 6 vessels arriving at Kahului. Two carried vegetable matter consisting of 18 lots, 2104 parcels, all passed as free from infestation.

INTER-ISLAND INSPECTION

Fifty-six steamers plying between Honolulu and other island ports were attended and the following shipments passed:

Taro	488 bags
Vegetables	341 pkgs.
Fruit	424 pkgs.
Plants	127 pkgs.
Pine Shoots	8,607 bags
Sugar Cane	44 cases
Seeds	6 pkgs.

Total passed 10,037 pkgs.

Sixty-four packages of plants and 1 package of fruit were rejected on account of infestation, undesirable soil and non-compliance with rules.

Respectfully submitted,

E. M. EHRHORN,
Chief Plant Inspector.

DIVISION OF ANIMAL INDUSTRY.

REPORT OF ASSISTANT TERRITORIAL VETERINARIAN, OCTOBER, 1920.

Honolulu, November 18, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to submit the following routine report for October:

TUBERCULOSIS CONTROL

Work in this line was confined to retesting the imported Holstein bull at the Quarantine Station which had reacted to the test two months

previously. The bull responded quickly to the test, showing a reaction about three times the size of the previous one. This bull was injected on October 16 in the morning and at 3 p. m. showed a decided reaction. This reaction reached its maximum size on October 18 and remained in evidence until the day it was slaughtered, October 30.

Post-mortem examination revealed evidence of advanced tuberculosis, the following lesions being found:

Nodules in both retro pharyngeal glands; right laryngeal gland greatly enlarged and filled with numerous tuberculosis centers; nodules in the posterior mediastinal gland and diaphragmatic lobe of the right lung; one small nodule in the right epididymis.

Besides the above, three steers condemned in Kona by Dr. Rowat and sent here for slaughter were post-mortemed, all showing typical lesions of tuberculosis.

SWINE PLAGUE AND NECROTIC ENTERITIS

A considerable outbreak of mixed infection occurred among a herd of swine at Nanakuli:

History: About two weeks before the outbreak was reported pigs had been dying a few at a time until 15 or 20 had been lost.

Sanitary Conditions: The sanitary conditions surrounding these hogs were far from good. Although the man in charge asserted that he cleaned the feed troughs every day they bore no evidence of it. The wallowing pool was filthy, being filled with heavily polluted water with a floating green scum. There was no drainage and it looked as if it had been many months since it was drained and cleaned.

Symptoms and Diagnosis: Upon arrival seven or eight young pigs were found in various stages of the disease. They were emaciated, with weak staggering gait, with occasional cough and diarrhea. A diagnosis of mixed infection was made.

Post-Mortem Examinations: One of these sick hogs was killed and a careful post-mortem examination made with the following result:

A pneumonia of the swine plague type involved the lungs; the heart showed a few petechiae on the epicardium and endocardium; the lymph glands throughout the body were slightly swollen and hemorrhagic. A diffuse necrotic enteritis was revealed throughout almost the entire length of the large intestines. These post-mortem findings fully substantiated the diagnosis made.

Treatment: All the hogs, sick and well, which could be corralled were injected with mixed infections bacterins (swine) obtained from the Jensen-Salsbery Laboratories and negro-bacillosis powder administered in the feed. The owner was advised to have the hogs removed to a new, clean place and kept in a sanitary condition.

The effects of the treatment were not immediately apparent, first, because of the severity of the outbreak and secondly the unhygienic conditions under which they were kept. It is significant that all deaths stopped upon removal of the animals to clean surroundings.

ANTI-RABIC VACCINATION

During the past month 15 dogs were vaccinated against rabies. No untowardness developed in any during the period of vaccination.

IMPORTATION OF LIVE STOCK

During the past month 50 vessels entering the port of Honolulu were boarded and inspected by the Live Stock Inspector, out of which number six were found to carry live stock for this Territory:

Horses	Mules	Cattle	Swine	Dogs	Poultry
3	42	52	6	2	184 crates

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

Available, Free of Charge, at the Government Nursery, 1438 S. King Street, for Arbor Day Planting (November 19th, 1920).

LIST OF TREES

Common Name	Scientific Name
Golden Shower	<i>Cassia fistula</i>
Pink Shower	<i>Cassia grandis</i>
Pink and White Shower	<i>Cassia nodosa</i>
Royal Poinciana	<i>Poinciana regia</i>
Yellow Poinciana	<i>Peltophorum ferrugineum</i>
Jacaranda	<i>Jacaranda mimosaeifolia</i>
St. Thomas Tree	<i>Bauhinia tomentosa</i>
Pepper Tree.....	<i>Schinus molle</i>
Christmas Berry	<i>Schinus terebinthifolius</i>
Monkey Pod	<i>Pithecolobium saman</i>
Silk Oak	<i>Grevillea robusta</i>
Milo	<i>Thespesia populnea</i>
Mahogany	<i>Swietenia mahagoni</i>
Ironwood	<i>Casuarina equisetifolia</i>
Monterey Cypress	<i>Cupressus macrocarpa</i>
Arizona Cypress	<i>Cupressus arizonica</i>
Cook Pine	<i>Araucaria cookii</i>
Australian Red Cedar	<i>Cedrela australis</i>
Lemon Gum	<i>Eucalyptus citriodora</i>
Swamp Mahogany	<i>Eucalyptus robusta</i>
Royal Palm	<i>Ocotelea regia</i>

Orders for trees should be addressed "Government Nursery, P. O. Box 207, Honolulu" and should be in our hands not later than November 15th, and the plants will be ready for delivery on and after November 18th. Each applicant is entitled to twenty-four (24) trees.

The other islands will be supplied at the following sub-nurseries:

Hawaii—Hilo sub-nursery, in charge of Bro. M. Newell.

Maui and Molokai—Haiku sub-nursery, in charge of James Lindsay.

Kauai—Kalaheo sub-nursery, in charge of Joe Rita, Jr.

BY AUTHORITY.

TERRITORY OF HAWAII.
BOARD OF COMMISSIONERS OF AGRICULTURE AND
FORESTRY

AMENDMENT TO RULE VIII—DIVISION OF ANIMAL INDUSTRY.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby amends Rule VIII of the Division of Animal Industry to read as follows:

Rule VIII—Dogs. Sec. 1 (a). All dogs arriving in the Territory of Hawaii and coming from or through any country, state, or territory where rabies is known to exist, shall be kept in quarantine on premises provided by this Board for a period of one hundred and twenty (120) days counting from the date of embarkation, or may be vaccinated against rabies and held for observation for thirty (30) days after the last injection.

Sec. 1 (b). The above amendment shall take effect upon approval by the Governor.

Approved this sixth day of November, 1920.

C. J. McCARTHY,
Governor of Hawaii.

Honolulu, T. H.

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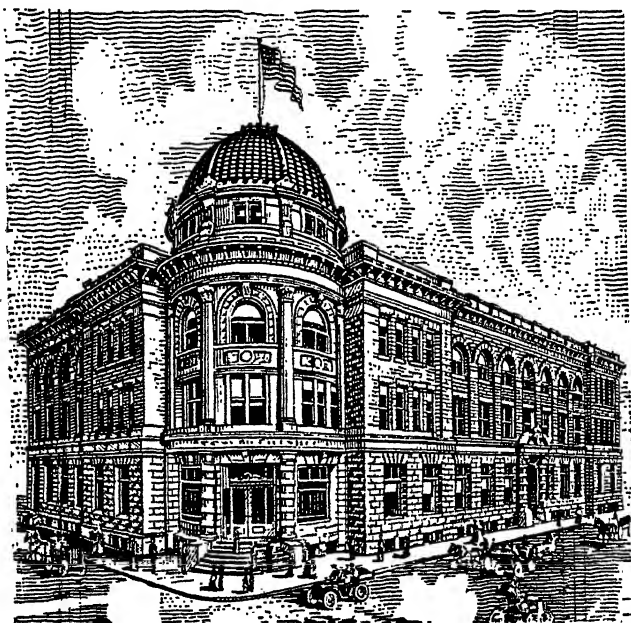
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C. S. JUDD,
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THE HAWAIIAN FORESTER AND AGRICULTURIST

VOL. XVII.

HONOLULU, DECEMBER, 1920.

NO. 12

Dr. L. N. Case was on December 1, 1920, appointed Territorial Veterinarian to succeed the late Dr. V. A. Norgaard.

An article in this issue by the new Territorial Veterinarian on *hemorrhagic septicemia* will be found of value to breeders of cattle, hogs, and fowls.

The results of a test, conducted by the Superintendent of Forestry, of the germination of algaroba seed, when given different treatment before planting, are contained in an article in this issue.

With the seed of the Chaulmoogra oil tree received on November 27, from Mr. J. F. Rock from Siam, it is hoped to start sufficient trees to supply the local demand for the oil in this Territory.

The recent importation into the Territory of a large number of hogs for butchering purposes is a new departure, for during a number of years past the Territory has been able to supply the local demand for pork.

Mr. V. L. Ellis was on December 13, 1920, appointed Forest Ranger at Large for the Territory and has begun his duties in the Waianae District, Oahu, which will be concerned chiefly with forest protection work.

The second installment of an article on Formosan termites and methods of preventing the damage done by them is contained in this issue and will be found of interest to those in this Territory who are troubled by these destructive borers.

Arbòr Day was celebrated this year on November 19, and a total of 6705 trees was distributed from government nurseries on the four main islands for planting on this day. At the Government Nursery 1732 school children of Honolulu called and were given one tree each.

The movement, started at the recent special session of the Legislature, to acquire 4000 additional acres of privately-owned land in the Kohala Mountains, Hawaii, is a step in the right direction of

reserving and protecting the forests on important watersheds and it is hoped that this project will be consummated before further inroads are made by cattle on the remaining forest in that region.

Mr. D. T. Fullaway, Entomologist of the Board, left Honolulu on Thursday, December 9, 1920, for Hong Kong and Calcutta where, for the purpose of introduction into the Territory, he will make a search for further parasites on the melon fly and for wasps which are responsible for the production of fertile seed on the trees belonging to the genus *Ficus*.

It is with great regret that announcement is made of the death on November 15, 1920, of Dr. Victor A. Norgaard, Territorial Veterinarian, for the Board for a period of 15 years. At the Board meeting held on November 30, the following resolutions in appreciation of his services were adopted:

"Resolved, That in the death of Victor A. Norgaard, Territorial Veterinarian of the Board of Agriculture and Forestry, this Board and the Territory have lost a most capable and efficient officer who for a period of fifteen years by his able direction has not only greatly suppressed animal diseases found here and prevented new diseases from coming in, but also has caused great advancement in the principles of live stock breeding in this Territory.

"Resolved, further, that this Board in token of its appreciation of his valuable services cause this record to be made."

A biographical sketch of Dr. Norgaard appears in this issue.

BIOGRAPHICAL SKETCH OF DR. V. A. NORGAARD.

By DR. L. N. CASE, *Territorial Veterinarian*.

It is with deep regret that announcement is made of the death on November 15, 1920, of Dr. Victor A. Norgaard, Territorial Veterinarian in charge of the Division of Animal Industry of the Board of Agriculture and Forestry of the Territory of Hawaii.

Dr. Norgaard was born in Copenhagen, Denmark, on November 14, 1868. He was the son of Peter and Julie Norgaard and received his early education in the common schools of that country. At the early age of 18, he graduated with honors from the Veterinary High School of the University of Copenhagen, receiving the degree of V. S.

Realizing that the opportunities for advancement in the veterinary profession were greater in America than in his native land, he came to this country shortly after graduation and established himself in New York City, going from there to Lennox, Massachusetts, and finally to Madison, Wisconsin.

While at the last named place, experiments were started in the treatment of "lumpy jaw," *Actinomycosis* of cattle which early attracted the attention of prominent men is the U. S. Department of Agriculture with the result that he finally joined the staff of the Bureau of Animal Industry, then in its infancy.

As a Bureau inspector he was stationed at different times in all the larger packing establishments of the country. It was while stationed in Chicago with the packing firm of Nelson, Morris and Company that his early experiments with *Actinomycosis* in cattle were finally completed and the feasibility of a practical cure of the disease demonstrated.

These early experiments and the brilliant results attained issued in a career which few veterinarians have equaled.

From the Meat Inspection Division, Dr. Norgaard was transferred to the Division of Field Investigation and at one time or another was stationed by the Bureau in practically every state in the Union in the investigation, control and eradication of infectious diseases of live stock.

In 1891 the position of Chief of the Pathological Division of the Bureau was offered to him and he accepted it. He held this position for a period of ten years, resigning November 15, 1901, to become associated with the West Disinfecting Co., in New York City.

As Chief of the Pathological Division he started and conducted many original investigations in animal diseases and brought the Division up to a high standard of efficiency. As an author he published numerous pamphlets on infectious diseases of live stock which are considered standard works and which are frequently quoted. At this period he reached the pinnacle of his career establishing a monument to himself for all time through the manufacture and free distribution of Black-leg vaccine, thereby saving thousands of head of live stock and the owners hundreds of thousands of dollars. Millions of doses of this vaccine are yearly prepared by the Federal Bureau according to the original formula and distributed throughout the live stock sections of the country.

It was principally through the efforts of Mr. Jared G. Smith that Dr. Norgaard's services were obtained for the Territory of Hawaii in 1905. What he accomplished in the control and eradication of contagious and infectious diseases of live stock within this Territory and the prevention of their introduction from the outside world is a matter of record. It is certain that the Territory is safeguarded from outside contagion in a manner excelled nowhere in the world. The complete eradication of sheep scab and glanders has saved the Territory many thousands of dollars. The interest evinced in animal industry in general and the great advance in the principles of live stock breeding during the past fifteen years are due in large part to his untiring efforts and able direction.

A man of unusual ability and education in his chosen profession

he was also liberally educated in other lines and could converse with keen intelligence on almost any subject. Surrounding himself with the best in literature and art he had the ability ably to criticise both. Being more or less of a recluse and of a somewhat erratic temperament, he had few intimate friends, but those who knew him well appreciated the sterling qualities which he possessed.

In Dr. Norgaard's death the live stock industry of this Territory lost a sincere friend, an able adviser and director and the veterinary profession a brilliant member.

ALGAROBIA SEED GERMINATION TESTS.

By C. S. JUDD, *Superintendent of Forestry.*

One often comes across the statement that the seed of the algaroba (*Prosopis juliflora*) when eaten by stock is not crushed, but on passing through the alimentary system of the animal is rather prepared for quick germination by the action of the digestive fluids. To ascertain just what effect this process has on the germinating capacity of algaroba seed, a comparative test was undertaken at the Government Nursery in Honolulu, beginning in December, 1919, with the results given below.

The fruit of the algaroba, the most valuable lowland tree in the Hawaiian Islands, consists of a yellow pod about 6 inches long and half an inch wide, each pod containing about 20 seeds. Each seed is immediately surrounded by a crustaceous envelope which is enclosed in a thick spongy coat of sweet pulp. It is this sugary content which makes the pod relished by animals. So hard and tough is the protective parchment-like seed covering that in order to secure the clean seed it is necessary to cut out each with a sharp knife.

For this test six different sets of seed, of 100 each, were used and these were first treated in the following manner:

- No. 1. Naked seed, untreated.
- No. 2. Naked seed, placed in boiling water and soaked for 24 hours.
- No. 3. Seed in parchment covering, untreated.
- No. 4. Seed in parchment covering, placed in boiling water and soaked for 24 hours.
- No. 5. Naked seed, which had been passed through a horse by feeding the beans. Upon recovery the seed was removed from the parchment covering.
- No. 6. Seed in parchment covering which had passed through a horse.

After passing through the alimentary system it was found that

some of the parchment coverings had split open and the seeds had turned black and were somewhat swollen. Other parchment coverings had not been opened by the process and the seed was still light brown in color and only slightly swollen.

The seed was recovered from the horse on December 18, 1919, and the germinating tests were all started on December 20, 1919, by sowing the seeds in the usual seed boxes and giving them a light covering of soil. The test was continued for 119 days or until April 16, 1920, when the last seedlings appeared and the experiment was considered closed.

The resulting percentage of germination was as follows:

Seed Number.	Percentage of Germination.	No of days of last Germination.
1.	87	119
2.	86	16
3.	67	119
4.	58	47
5.	79	104
6.	57	119

From the above it will be seen that the naked untreated seed showed the highest percentage of germination or 87% and the seed in the parchment covering which had passed through the horse the lowest or 57%.

1. The germination of the naked untreated seed was spread rather consistently throughout the entire period of 119 days and only 21% germinated in the first 7 days.

2. All of the naked seed which received the hot water treatment germinated by the 16th day and 80% was up in the first seven days. This shows not only that the seed was not injured by the hot water treatment (when compared with the germination of the naked untreated seed, which serves as a check) but also that the germination was thereby very greatly accelerated.

3. The seed in parchment, untreated, showed consistent germination, after germination once began, but not a single seed sprouted until the 13th day when one seedling appeared and no more sprouted until the 26th day when a few began to come up and the general germination began. From this it is apparent that the tough parchment covering greatly delays germination.

4. The seed in parchment which received the hot water treatment did not produce the germination results that might have been expected. Germination, however, began on the sixth day and was consistent throughout the period, which lasted only until the 47th day, after which no more seed sprouted.

5. The seed which had passed through the alimentary system of the horse and had been removed from the parchment covering ranked third with a germination percent of 79. During the first seven days 32% germinated, showing for quickened germination a beneficial result of this treatment greater than the use of un-

treated naked seed but not as great as when the seed was soaked. Germination was consistent after this but diminished until the 104th day, after which no more seed sprouted.

6. The seed in parchment covering which had passed through the horse, which is the natural method by which algaroba seed is usually sown and spread over the country, gave the poorest results of all with a germination of only 57%. During the first seven days, only 12% germinated and the remainder sprouted consistently throughout the balance of the full 119 day period.

Summary. While the above test may not be considered extensive enough to be conclusive, it is sufficient at least to furnish the following preliminary deductions:

1. Algaroba seed is prepared for quick germination on passing through the alimentary system of a horse only when the seed is removed from the tough parchment-like covering.

2. Naked algaroba seed, untreated in any manner, gives the best germination results.

3. Placing naked seed in boiling water and soaking it for 24 hours does not injure the seed but greatly hastens germination.

4. The parchment-like seed covering greatly hinders germination.

THE PROTECTION OF LIVE STOCK IN HAWAII AGAINST INFECTIOUS AND CONTAGIOUS DISEASES—III.

By DR. L. N. CASE, *Territorial Veterinarian.*

HEMORRHAGIC SEPTICEMIA

This disease occurs in cattle, sheep, horses, swine and poultry and depends more or less exclusively upon infection with the hemorrhagic septicemia group of micro-organisms. In Europe, it also affects the stag, shuffle deer and roebuck. In the United States the disease appeared and was recognized by veterinarians in 1909 in six of the Eastern states and by 1910 had spread throughout the Middle West. In 1911 it threatened the extermination of the buffalo in Yellowstone Park but was checked by the perfecting, by the Federal Bureau of Animal Industry, of the method of vaccination which is now used throughout the United States wherever the disease occurs.

In this Territory this disease has been known in cattle since the early part of 1909 when a small outbreak occurred among cattle on the island of Hawaii and later the same year in cattle shipped to Honolulu stock yards from the Kona coast after particularly rough trips. Quite recently a number of cases have occurred among beef and dairy cattle on Maui, but it was not until the spring of this year (April-May, 1920), that the disease could be said to have assumed the character and spread of an epidemic,

when it appeared in the cattle of the Kau district of Hawaii with a mortality of two per cent among an aggregate of six thousand cattle belonging to various owners. This outbreak was promptly checked by vaccination.

As the micro-organisms causing this disease exist in the soil and normal air-passages of cattle and only upon certain conditions which tend to lower the vitality and powers of resistance of the animal do they assume a pathological significance, it would seem advisable that stock owners should be on the lookout for its appearance and especially that they should not hesitate to report an outbreak even if only a few animals are affected, and obtain such assistance and protection for their own and their neighbors' live stock as the Territory has provided for that purpose.

PATHOLOGY OF THE DISEASE IN CATTLE.

Hemorrhagic septicemia in cattle is an acute infectious disease which in the early stages of an outbreak often causes death in the course of a few hours. One or more dead animals may be found before the owner is aware of the presence of the disease in his herd or has noticed anything wrong with his animals, especially if the disease breaks out among cattle on the open range or in large pastures.

Post-mortem examination of an animal dead of hemorrhagic septicemia presents a strange appearance. Practically every organ in the body is affected. They look as if a bucket of blood had been thrown over them so closely are they covered with hemorrhages of varying sizes. Large masses of gelatinous material are found in both body cavities and all the lymph glands are swollen and drip blood when cut. The intestines may be filled with blood and their contents covered with bloody mucous. The lungs become the seat of gangrenous pneumonia, their appearance changing from the normal pink to a greenish color, and are more or less solidified and interspersed with streaks of a gelatinous nature.

The spleen, which is materially changed in appearance in anthrax, is rarely if ever affected in hemorrhagic septicemia and while there may be bloody discharges from the natural openings of the body they are different in character from anthrax and the blood retains its normal tendency to clot.

A disease as fatal as anthrax, it is more to be dreaded in that it may spring up at any time, while anthrax cannot occur except by direct "plant" or importation of animals affected or exposed to infection.

The Division of Animal Industry has on hand at the present time sufficient amounts of anti-hemorrhagic septicemia serum, vaccine and bacterin to take care of any outbreaks unless the disease should appear all over the Territory at the same time.

SWINE PLAGUE.

Swine plague, the hemorrhagic septicemia of hogs, has been observed in this Territory since 1909 and outbreaks of a more or

less serious nature have been reported from practically every island of the group.

While the post-mortem lesions do not show the same degree of severity as those in cattle they are, nevertheless, characteristic. Hemorrhages throughout the body are the rule, with the lungs principally affected in the uncomplicated type of the disease.

Straight swine plague, however, is rarely observed, the disease being complicated early in its course by secondary infections causing a necrotic enteritis. This double infection, known as Mixed Infection is the principal cause of loss among swine in this Territory. The same warnings to owners may apply in this disease as in hemorrhagic septicemia of cattle.

We have on hand at present an adequate supply of biologics to combat outbreaks of this disease.

FOWL CHOLERA.

Only one outbreak of hemorrhagic septicemia of poultry, or fowl cholera, as it is generally called, has come to notice but the virulence of the disease is amply demonstrated in that it exterminated 200 chickens in about 48 hours.

FORMOSAN TERMITES AND METHODS OF PREVENTING THEIR DAMAGE.

(Concluded*)

By MASAMITSU OSHIMA

TERMITE-PROOF BUILDING CONSTRUCTION

Serious damage to the Japanese buildings in Formosa is due to the Japanese timbers that are used as the principal building materials; namely, pine and cryptomeria. They are most liable to damage, because they contain a large amount of cellulose in comparison with other timbers.

When Japan occupied Formosa, Japanese architects had had no experience in regard to methods of preventing the damage caused by termites. Therefore, they erected buildings there just as in the mother country, paying no attention to the termite. This is another reason for the serious damage, for Japanese buildings are not suited to the Tropics. They rather attract the termite, since the foundation timbers are laid in contact with the ground.

From the point of view of economy, it is impossible to eliminate such nonresistant timbers from Japanese buildings. Therefore, a discovery of a new method of building construction, by which the attack of the termite can be absolutely prevented, becomes an important problem.

As a result of bitter experience during the last twenty years,

*Phil. Jour. Science XV, 4.

the method of constructing buildings and the treatment of nonresistant timbers have been greatly improved. As it is practically proved that the termite-proof building construction that has been recently adopted by the Government of Formosa is somewhat satisfactory, I, having been chiefly concerned with the investigation, wish to explain the method in detail.

Disinfection of the ground.—Not only is *Coptotermes formosanus* widely distributed throughout Formosa, but it occupies the whole ground densely; so that, as a first step in erecting a building, it is absolutely necessary, to destroy the pest, to keep the site free from the source of the damage. For this purpose, heavy oil of petroleum, creosote oil, or Termitol (a mixture of heavy oil of petroleum and cresol) is sprinkled over the whole surface of the site, using 1 gallon (about 4 liters) of the fluid to 6 square feet (about 0.6 square meter) of area.

These fluids are nonvolatile at ordinary temperature and insoluble in water. They are effective for a long time, as they remain in the ground unchanged.

Footings.—To keep a wooden building free from termites, care should be taken not to use timbers in contact with the ground. To do this, it is necessary to use bricks and concrete in footings, even in the case of a wooden building.

The termite-proof concrete layer.—In order to prevent the entering of the termite, it is necessary to disconnect the upper parts of buildings from the soil. After the footings have been completed, a layer of cement concrete about 6 inches (about 15 centimeters) thick is spread over the whole area of the site at ground level, the edges being extended about 3 feet (about 1 meter) beyond the external walls of the building. Along the edges small drains are made, surrounding the whole concrete layer. Then the entire surface of the layer is covered with a thin stratum of cement mortar to fill up all the pores and cracks.

To reach the building, termites must either penetrate the concrete layer or cross the drains from the outside. It is proved, however, that cement concrete is quite safe against the attack of the termite, while lime concrete is not. Not only is the first method of attack almost impossible, but the second as well, for the drains are so constructed that they catch rain water from the eaves and thus prevent the intrusion of the pest. In the dry season the termite very often crosses the drains; but its covered tunnels can be found at once and it is readily driven out, because the outer parts of the concrete layer extend beyond the external wall and are used as sidewalks.

The aim of constructing a continuous layer of concrete above the ground level is to prevent absolutely the entering of the termite by means of an impermeable barrier. Great care should be taken, therefore, to keep the whole layer perfectly compact, and to avoid the occurrence of cracks and pores. To do so, the entire layer must be spread at the same time, in a continuous, even plane.

One of the practical difficulties of constructing a continuous concrete layer is that it stops construction of all other parts of the building until the concrete is entirely set. The concrete layer is divided into two or three parts, and each part is spread over the ground at a different time. After all the parts are joined together, the whole surface is covered with cement mortar. At a glance such a concrete layer seems as satisfactory as the ordinary layers. However, junctions between the sections are not tight enough to prevent the intrusion of the termites, and in many cases it was proved that the concrete layer had been penetrated by *Coptotermes formosanus* when it was ill-constructed; that is, with the layer divided into several parts.

Sometimes the architect is required to build the ground floor somewhat higher than the ground level. In such cases the concrete layer should be constructed, and the two layers on different levels connected by another vertical layer. This method is not advisable because of the presence of many junctions, which are liable to be passed through by the termite. If it is necessary to raise one part of the floor, it is better to make two concrete layers separately, instead of joining the two.

First floor.—Dark places with a proper quantity of moisture are most favorable for the habitation of *Coptotermes formosanus*. It is necessary, therefore, to provide ventilation holes and skylights for inclosed spaces, such as underparts of floors or inner parts of roofs.

In the case of storehouses or other special buildings the termite-proof concrete layer may be directly used as the first floor, but in ordinary houses the first floor should be raised about 3 feet (about 1 meter) above the concrete layer, by means of brick walls and brick supports. Two methods are adopted for constructing the first floor: the external parts of the building are entirely surrounded with brick walls about 3 feet (about 1 meter) high, which are provided with square ventilation holes, 2 by 1.2 feet (about 0.6 by 0.4 meter), situated 6 feet, (about 2 meters) apart; the floor rests upon square brick supporters; the floor is placed upon brick arches. Even in wood construction the present method is adopted, all woodwork being placed upon brick supports.

The advantages of this construction are as follows: None of the woodwork is in contact with the ground; the basement of the building is always kept dry and clean; the ample light makes inspection easy; and it is effective in keeping the building free from rats and mice, which are the propagators of the plague.

Second floor; brick building.—The second floor is constructed of reenforced concrete just like the concrete layer on the ground level, making a continuous plane. Its edges are extended to the external part of the walls, instead of being partially inserted into the brick walls. The upper and the lower surfaces of the layer are covered with cement mortar, and all the crevices, even

the holes made for gas and water pipes, etc., are carefully filled. Brick walls and partitions on the second floor should be absolutely disconnected from those of the lower floor in order to confine any damage to a limited area. In addition a number of ventilation holes or windows are made through the external walls to expose to the light the inclosed space between the second floor and the ceiling of the lower story.

Second floor; wood construction.—The distance between the beams of the second floor and the ceiling of the lower story is somewhat extended, and several ventilation holes or windows are made in the external walls to allow sufficient light to enter the interspace.

Roofs.—Both in brick and wooden buildings the inside of the roof is usually dark and contains a lot of timber, thus rendering it a favorable habitat for the termite. To get rid of this danger the interspace between the tiebeams and the ceiling is somewhat extended and several windows are made in the external walls.

Brick walls.—Care should be taken to prevent the entrance of the termite into brick walls, because it is difficult to destroy the insect, which lives in the voids between the bricks. In order to prevent its intrusion, the surface of brick walls should be entirely covered with cement mortar.

Tiles.—Two kinds of tiles are used for roofing Japanese houses; namely, ordinary tile and hanging tile. In laying the former, wet clay is used for bedding; the tiles are embedded in clay one by one and fixed to each other with lime mortar. Clay is never used with the other kind, the tiles being laid on the roof directly and fixed with pieces of wire. It is desirable to use the hanging tile only, for the layer of clay is occasionally used as an abode by the termites when they reach the roof.

Timbers.—All the timbers that are used in hidden places are treated with Termol, a special chemical made in the Camphor Bureau of the Government. Both immersion and impregnation are adopted for treating timbers.

Mortar and concrete.—It is strictly forbidden to use lime mortar and lime concrete, for lime is attacked by the termite. In constructing Government buildings, cement mortar and cement concrete only are used.

DEFECTS OF THE TERMITE-PROOF BUILDING CONSTRUCTION

It has been proved that if the concrete layer be kept in a sound condition—in other words, if there are neither cracks nor joints in the layer—the above-described method of construction is entirely satisfactory in preventing the intrusion of the termite from the ground. But there are many records in Formosa of theoretically well-constructed termite-proof buildings being infested by termites, notwithstanding the existence of a perfect concrete layer.

Is there any defect in the present termite-proof building construction, or is there some way by which termites can infest

buildings that is not controlled by means of the concrete layer? The answer to these questions is very simple.

As shown on a preceding page the mature males and females of *Coptotermes formosanus* leave the old nest in a swarm early in June. After separating into pairs, each couple establishes a new colony, raising a number of workers and soldiers. It is possible, therefore, that in the case of a building infested by the winged forms, the damage may be extended year after year, in spite of the existence of the termite-proof concrete layer.

The office of the Nippon Yusen Kaisha at Keelung, Formosa, which was built in 1915, is said to be a good example of the termite-proof construction. Nevertheless, in August, 1916, that is, only one year later, damage caused by termites was found on the second floor. At that time there was no damage on the first floor: there was no connection between the nests constructed on the second floor and the ground; the concrete layer on the ground level was perfect, having neither crack nor joint; many hyaline wings, which had been cast by the imagoes of *Coptotermes formosanus*, were found in the building; couples accompanied by young larvae were found in the brick walls, especially in wood bricks. Such being the case, there could be no doubt that the building had been infested by the winged form, which entered the house in the swarming season.

The concrete layer on the ground level may be strong enough to prevent the pest that starts from the ground, but it is of no use in preventing the intrusion of the winged forms. Certainly, in Formosa, the percentage of the damage to buildings has decreased since the new method of construction was adopted; but the present building construction is not absolutely termite proof, because it does not prevent the entrance of the winged forms.

TESTS OF THE RELATIVE RESISTANCE OF NATIVE AND EXOTIC WOODS

It is evident that the changes made in several parts of buildings in Formosa are more or less effective in preventing the damage by *Coptotermes formosanus*; but, since it is almost impossible to prevent the entrance of the winged forms, an investigation to discover other methods of prevention becomes necessary.

From an economic point of view it is hard to eliminate non-resistant timbers from building materials, especially in the case of Japanese buildings. Under such conditions the treatment of timbers so as to provide immunity from the attack of the termite is considered more important than the former method; because it is certain that the preventive measures, namely, constructing the concrete layer, etc., become unnecessary if the nature of timbers can be so changed that they are absolutely immune from the attack of the termite.

Certain species of wood are said to be naturally highly resistant to the termite. According to Thomas E. Snyder, forest entomologist of the United States Department of Agriculture, teak (*Tectona grandis*) from Siam and Burma, greenheart

(*Nectandra rodia*) from South America and the West Indies, peroba (several species of *Aspidosperma*) from South America, and mahogany (*Swietenia mahoganii*) from tropical America seem to be immune from the attack of the North American termites. Hagen also states that teak (*Tectona grandis*) and ironwood (*Sideroxylon*) of India are immune from attack by termites. George P. Ahern, formerly director of the Philippine Bureau of Forestry, states that the following woods are not subject to attack by the *anay*, a native Philippine termite: *Dinglas* (*Eugenia bracteata* Roxb. var *roxburghii* Duthie), *ipil* (*Intsia bijuga* Gray), *molave* (*Vitex littoralis* Dcne.), and *yacal* (*Hopea plagata* Vidal). In addition to these, *Cedrus deodard* from India, *Cedrus atlantica* from northern Africa, *Callitris glauca* (cypress pine) from Queensland, *Eucalyptus marginata* from Australia, and *Erythrophloeum lim* from Cochin China are reported to be immune from termite attack.

As a first step in the investigation it was necessary to prove whether these so-called immune timbers are really effective in preventing termite attack or not. To do this, forty-five species of native and exotic woods were selected and the test carried on as follows:

Method of investigation.—Each timber was cut into small blocks of definite size, 2 by 2 by 15 inches (about 5 by 5 by 38 centimeters); hundreds of these blocks were buried in the infested ground; different kinds of timbers were mingled, care being taken not to group the same species in one place; from time to time all the blocks were dug out for inspection, and after eliminating the infested ones the others were buried again.

Locality of the experiment stations—Tainan, southern part of Formosa; and Matsubase, Kiushiu, Japan proper.

Result of the test at Tainan.—The ground was infested with *Odontotermes formosanus* (Shiraki), which is very common in the southern part of Formosa. The blocks were buried on November 17, 1912, and the final inspection was made on July 15, 1913.

Result of the test at Matsubase.—The ground was infested by *Coptotermes formosanus* Shiraki. The experiment station was selected in Japan proper as well as in Formosa, in order to test the effect under different conditions, especially the effect by a different species of termite. The blocks were buried on February 11, 1913, and the first inspection was made on October 8, 1913, after two hundred forty-nine days.

Although the duration of the experiment was nearly the same at Tainan as at Matsubase, the results obtained were slightly different. Thus, in the latter locality, kayil, palo maria, and malacmalac were more seriously attacked; lim, tallow wood, iron bark, grey gum, white mahogany, supa, betis, pagatpat, calantas, malugay, lanete, bansalaguin, lanutan, bantiyo, and grey box were less seriously attacked; red narra, guijo, yellow narra, white stringy-bark, acle, amuguis, tucang-calao, tindalo,

batitanan, black butt, dungon, mancono, molave, and ipil, which have been attacked by *Odontotermes formosanus*, were immune. These differences seem to be due to the inactivity of the insect effected by somewhat lower temperature than in Formosa, as well as the existence of a smaller number of individuals. In order to get a more satisfactory result, the blocks that were found free from attack were buried again in the same place and left untouched until July 19, 1915.

Twenty-one months after first inspection, all the blocks were dug out.

These results agree quite well with those obtained at Tainan, although the Philippine woods molave and ipil have been slightly attacked by *Odontotermes formosanus*. It is a striking fact that teak and cypress pine, which are said to be absolutely immune from termites in the Tropics, are also free from the attack of two species of Formosan termites; namely, *Odontotermes formosanus* and *Coptotermes formosanus*. It seems reasonable, therefore, to conclude that teak and cypress pine are absolutely immune timbers.

The following paragraphs are quoted from Boulger:⁵

Cypress pine: *Callitris glauca* R. Br. (?); family Coniferae. Renowned for its pleasant odor—camphoraceous or sometimes reminding one of sandal-wood—and its great power of resistance to insect pests. Cypress pine is about the last timber that the white ant will attack. Some of the species, the red or black pine in particular, produce very showy timber; in fact, many of the plants are so gorgeous in appearance that care is required in using it for decorative purposes, lest it should have too overpowering an effect. At the same time much of the timber is of a quite, handsome character. The prevailing color of the figure is grown of various shades. It may be readily dressed to a smooth and glossy surface. It is extensively used in buildings liable to be attacked by white ants, for house blocks, linings, and ceilings of houses, and for telegraph poles. It is one of the most luxurious firewoods; it burns well, and in burning emits a delicious fragrance very generally admired. It is chiefly distributed in the drier parts of New South Wales, but some is available in the north coast district of Australia.

Teak: *Tectona grandis* L.; family Verbenaceae. It reaches a height of 80 to 100 feet, diameter 3 to 4 feet, sometimes larger. Trunk straight leaves large, drooping, and deciduous, simple and opposite, with a dense mat of velvety hairs beneath, varying in size from 19-33 centimeters long, and 13.5-22 centimeters wide, though sprout leaves are much larger.

Color of the timber is light straw-color to a brownish red, when fresh, but darkening on exposure. Some of the teak of the Decan is beautifully veined, streaked and mottled. Teak varies much according to locality and soil, that of Malabar being darker, heavier, and rather stronger, but not so large as that of Burma. Though without shakes on its outer surfaces, teak nearly always has a heartshake, which, owing to a twist in the growth, may often at the top be at right angles to what it is at the butt, thus seriously interfering with conversion, though often little affecting the use of the timber in bulk. In these shakes an excretion of apatite or phosphate of lime consolidates in white masses, which will turn the edge of most tools. Teak splits readily and is easily worked, but it owes its superiority for ship-building over both pine and oak in part to its freedom from any change of form or warping, when once seasoned, even under the extreme climatic

⁵ Boulger, G. S., Wood.

variations In India teak is used for railway sleepers, bridges, buildings and furnitures.

Teak is very fragrant when fresh and resembles rosewood, owing to an oleo-resin which also renders the wood probably the most durable of known timbers, making it obnoxious to termites and keeping off rust from iron in contact with it. Seasoned teak has, however, a very unpleasant smell, which has been compared to that of old shoe-leather. It is distributed in India, Burma, Siam, Ceylon, Java, Sumatra, and Celebes. In the Philippines small plantations occur in the southern islands, especially in Zamboanga district, Basilan Island.

RELATIONSHIP BETWEEN THE RESISTANCE AND THE PHYSICAL PROPERTIES OF TIMBER

It has been proved that some timbers are more highly resistant to termite attack than others; or, in other words, durability of timber seems to be effected by its physical or chemical properties. Determination of the factor of resistance is highly important in order to discover the preventive measures against termites. Therefore, the relation of the physical properties of timbers to the resistance is considered first.

Mancono and aranga, which are included in the group "very hard," are more seriously attacked than ipil, molave, and macaasim of the group "hard;" banuyo is less attacked than harder woods, such as palo maria, tindalo, etc.; calantas, a soft wood, is also less attacked than tucangcalao, amuguis, acle, etc.; which belong to the group "hard."

Ipil, molave, and macaasim, which are included in the group "heavy," are less attacked than very heavy mancono; that dungon, bansalaguin, batitanan, etc., are more seriously attacked than banuyo and palo maria of the group "moderately heavy;" and that amuguis, acle, guijo, etc., are also more seriously attacked than calantas, a light wood.

Thus the durability or resistance of timbers to the attack of termites is not effected by hardness or weight; that is, the immunity of timbers is not due to their physical properties.

RELATIONSHIP BETWEEN THE RESISTANCE AND THE CHEMICAL PROPERTIES OF TIMBER

Snyder⁷ states that the immunity or relative resistance of ironwood is not due to hardness—since Asiatic termites attack the hardest wood, *lignum-vitæ*—but to the presence in the wood of a substance (oils or alkaloids) repellent or distasteful to termites. He also states that the presence of tyloses or of gums may be factors in determining the durability and resistance of hardwood species. It has been proved that the physical properties of woods are not the real factor of resistance as suggested by that author. However, another suggestion of Snyder, that the presence of certain chemical substances in woods is the true factor, is somewhat dubious. As he gives no data in detail, it is hard to understand what are the principal ingredients and how they act in preventing the damage.

⁷ Bull. U. S. Bur. Ent. 94, (1916) 79, 80.

In order to determine the relationship between the resistance and the chemical properties of woods, I made the following investigation:

The quantity of ash and benzene extract in the above-mentioned woods was measured and compared with the percentage of damage obtained at Tainan.

Sampling.—A block of wood is cut along the three planes crossed at right angles, and the sawdust is collected. By the diagonal method reduction of the amount of the sample is made repeatedly, until about 20 grams of the sawdust are obtained. This sample is exposed for one hour in an air bath at 105° to 110° C. Then it is kept in a desiccator as a representative sample.

Method of estimation of ash.—A 1-gram sample is heated to redness in a platinum crucible over a Bunsen burner, and the incombustible substances are brought to a constant weight.

Method of estimation of benzene extract.—To estimate the benzene extract 5.00 grams of the sample are put into a Soxhlet apparatus and extracted with pure benzene for from six to ten hours. The benzene is driven off on a water bath, and afterwards the container is heated in an air bath at 120° C. to a constant weight. All determinations are made in duplicate.

It is evident that no special relationship exists between the resistance and the amount of ash and benzene extract. It is rather striking, however, that the percentage of benzene extract contained in cypress pine and teak, which are absolutely immune from the attack, is extraordinarily high.

SUMMARY

1. In Formosa three species of termite, namely, *Leucotermes flaviceps* Oshima, *Coptotermes formosanus* Shiraki, and *Odontotermes formosanus* (Shiraki), are injurious to wooden structures.
2. A pair of mature individuals of *Coptotermes formosanus* is able to start a new colony.
3. In a newly established colony of *Coptotermes formosanus*, egg laying begins five to thirteen days after swarming.
4. *Coptotermes formosanus* lays from one to four eggs a day.
5. Eggs of *Coptotermes formosanus* hatch in from twenty-four to thirty-two days after they are laid.
6. The soldier of *Coptotermes formosanus* develops from the egg laid by the queen.
7. *Coptotermes formosanus* attacks lime mortar.
8. The principal food of *Coptotermes formosanus* is cellulose.
9. The termite-proof concrete layer is entirely satisfactory in preventing the entrance of termites from the ground.
10. Teak and cypress pine are absolutely immune from the attack of Formosan termites.
11. The resistance of timber is not due to its hardness or weight.
12. The resistance of timber is not due to the inorganic compounds contained in it.
13. The resistance of timber is due to organic compounds that can be extracted by benzene or alcohol.
14. Cypress pine contains "guajol," a sesquiterpene alcohol.

15. Foochow cedar and Randai cedar contain "cedrol," a sesquiterpene alcohol.
16. The resistance of timber is due to the presence of sesquiterpene alcohol.
17. Camphor green oil contains 25 per cent of sesquiterpene alcohol.
18. Camphor green oil is entirely satisfactory as a preventive for buildings.
19. The anthracene oil fractionated from coal tar is effective in preventing the damage of *Odontotermes formosanus*.

DIVISION OF FORESTRY.

REPORT OF SUPERINTENDENT OF FORESTRY, NOVEMBER, 1920.

Honolulu, December 9, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I respectfully submit the following routine report of the Division of Forestry for the month of November, 1920:

TREE PLANTING.

During the month a total of 3,777 trees was set out as follows: On Tantalus on the Honolulu Watershed Reserve 407 koa trees were set out as replants in fail places and at Mikilua on the Lualualei Reserve there were planted out 877 red mahogany (*E. resinifera*), 797 Australian red cedar, 616 trees of a species of *Ficus* from Johore, India, 492 Cook pine (*Araucaria Cookii*), as well as 490 red mahogany and 98 koa replants.

Inspections were made of the Mikilua plantings on November 5 and 20, and it was found that in spite of dry weather the plantings on the whole are successful. Some of the eucalyptus species such as the bloodwood (*E. corymbosa*) and red gum (*E. rostrata*) are doing well where nothing else will succeed. During a dry season seedlings of the latter have made a height growth of 7 feet in five months.

Operations on the Waiahole Reserve, Oahu, were confined during the month to the weeding and cultivation of trees already planted and the digging of holes for new trees. The plantings were inspected on November 22, and it was found that practically all of the trees were doing well and showing good growth. The 550 kauri pine trees set out earlier in the year with a spacing of 10 by 10 feet are now 2 feet high and in a flourishing condition. The narra (*Pterocarpus indicus*) and molave (*Vitex parviflora*) from the Philippines are doing well and a few seedlings of the native bastard sandalwood, naio (*Myoporum sandwicensis*) are showing excellent growth.

At the request of Representative Norman K. Lyman a plan was drawn up and submitted to him for the establishment of a coconut grove at Kalapana Park, Puna, Hawaii.

On November 27, a package containing 7 lbs. of seed of the Chaulmoogra oil tree (*Hydnocarpus anthelminticus*) of Siam was received from Mr. Rock. A small quantity was sent to the nurseries on the other islands for propagation while the bulk was sown at the Government Nursery so as to produce seedlings for the establishment of this valuable tree on Oahu.

FOREST PROTECTION.

Ranger Harry L. Denison reports that there is no immediate need for the construction of the additional fence on the Waika-Kawaihae I boundary in the Kohala Mt. Forest Reserve, Hawaii, because the

present fence runs up to the Kehena ditch and cattle are not getting into the forest beyond this point.

On November 12, in company with the Assistant Superintendent, I inspected the government land of Waimano in the Ewa Forest Reserve. The whole forest on this land is in excellent condition and is serving well its function of conserving the runoff. Most of the reserve boundary across the land consists of natural barriers and although the old fence across the valley bottom was found to be out of repair there was no recent evidence of any cattle having entered the reserve. The necessary repairs will soon be made to this fence so as to prevent any possible damage by stock in the future.

During an inspection of the Hauula Reserve made on November 23, it was discovered that the gate on the fence line in the main valley was off its hinges and that in several places the wires were stretched apart allowing cattle to have access to the reserve. The gate was closed and temporary repairs made to the fence. On my return to town, I called to the Land Commissioner's attention the unsatisfactory conditions found at Hauula. The homesteaders there, by agreement with a former Land Commissioner, have the use of 193 acres of government land adjacent to the reserve as a free pasture on condition they keep the forest reserve fence in good repair. I have suggested to the Land Commissioner that he require the homesteaders to drive out their cattle and repair the fence within 30 days and thereafter to keep the fence in stock-proof condition.

An agreement has been made with the manager of the Haleakala Ranch whereby, at his suggestion, he will have his cowboys drive out of the Makawao Reserve, Maui, any stock found trespassing therein, the time of the men to be paid for by this Division. This should put a stop to the frequent trespass of tame cattle reported on that reserve. Additional trespass of tame cattle has been reported on the Waianae-kai Reserve, Oahu, and to remedy the situation there an additional ranger will soon be assigned to prevent this in the future.

Ranger Stone reports the completion on November 30, of a stretch of new fence 3,250 feet long built by the Hutchinson Plantation on the boundary of the Kau Forest Reserve, Hawaii, across the land of Kaalaki, Kau, Hawaii.

ACQUISITION OF LAND.

In response to the Board's request that the title to 1,006 acres of privately owned land in the Kula Forest Reserve be acquired by the Territory, the Governor has replied that an exchange can not be made under the law if the area exceeds 40 acres in area, that there is not sufficient money in the fund for land purchases on Maui which could be used for this purpose, but that the matter will be presented at the next regular session of the Legislature.

During the month I have attended two meetings of the Agricultural Committee of the House of Representatives on the question of the acquisition of parts of the lands of Kehona 2, Kahualilii, Kahunani and Waika, amounting to 4,155 acres, which it is desired to include in the Kohala Mt. Forest Reserve, Hawaii. Condemnation proceedings for Kehona 2 were instituted in 1910 but were never consummated. At the request of the committee I shall accompany some of its members on an examination of the land, leaving Honolulu on December 8.

On November 20, Assistant Superintendent Kraebel went to Hawaii and began an examination of the lower line of the Hilo Forest Reserve. He was instructed to see what additional lands could be included in the reserve by bringing the line down further makai and to do the preliminary work necessary for the establishment of a permanent boundary and the construction of a stock-proof fence. This work is necessary before active steps can be taken to prevent further cattle trespass in this reserve.

Respectfully submitted,

C. S. JUDD,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN, NOVEMBER, 1920.

Honolulu, Hawaii, December 13, 1920.

Superintendent of Forestry, Honolulu, T. H.

Sir:—I herewith submit a report of the work done during the month of November:

NURSERY.

Distribution of Plants:

	Pot Grown.	In Transplant Boxes.	Total.
Sold	90		90
Gratis	753	950	1,703
Total	843	950	1,793

COLLECTIONS.

Government Realizations:

Collections on account of plants sold	\$ 2.00
Permit for hunting birds	1.00
Rent of office, Nursery Grounds, for October	\$35.00
Total	\$38.00

Preservation Forest Reserves, Etc.

Fee for camp site No. 27, Kokee Camp, Forest Reserve, Kauai (December 1 to December 31, 1920)	\$ 0.58
Animal Industry Revolving Fund:	
G. R. Campbell, Sept. Vaccine 155 doses @ 11c	\$25.05
T. J. Marantia, 125 doses M. T. Bact	15.00
T. J. Marantia, 20 lbs. Necro-bacillosis powder	2.60
Oahu Railway and Land Co. Ranch—	
23 pkgs. 2 cc Mixed Infect. Bacterin, Jen-Sal.	23.00
24 pkgs. Necro-bacillosis powder	15.60
W. H. Hayselden, 459 doses Hemorrhagic serum	50.49
1 bottle serum	2.50
H. E. King for vaccine	32.50
Treatment of dogs (5)	120.80
Total	\$287.54

MAKIKI STATION.

The work done at Makiki Station consisted of the regular routine—the mixing and sterilizing soil, transplanting and potting plants, etc.

HONOLULU WATERSHED PLANTING.

The principal work done consisted of clearing land around spring heads at top of Makiki Valley. Four hundred and seven koa trees were replanted in places where others had died from drought and other causes.

LUALUALEI RESERVE.

Trees planted during the month:

Red mahogany, (<i>Eucalyptus resinifera</i>)	877
Johore ficus	616
Australian Red Cedar	797
Cook pine	492
Total	2,782

Trees replanted:	
Red mahogany, (<i>Eucalyptus resinifera</i>)	877
Koa	98
Total	588

ADVICE AND ASSISTANCE.

The writer has at the request of people in and around the city made the following number of calls and otherwise given advice and assistance:

Calls made	6
Advice by phone	8
Advice to people calling	12

In addition to the following report on the distribution of trees for Arbor day, the regular distribution for the month is as follows:

Hawaii:

Plantation Companies, etc. 2086 in seed boxes

Maui:

Plantation Companies, etc. 1773 " " "

ARBOR DAY (November 19, 1920).

Oahu: Trees to the amount of 4,370 were distributed from the Government Nursery to people residing on the Island of Oahu, 944 trees being ordered by letter and 1,694 by people calling (6 schools ordered 122 trees included in the above list) while 1,732 children called in the afternoon of Arbor Day and received one tree each. The distribution of trees was not as large as in former years, but people who took advantage of receiving free trees seemed to be well pleased and very appreciative.

Hawaii: Brother Newell reports that he distributed for Arbor Day planting 1215 trees.

Maui: Mr. James Lindsay in his report states that he distributed 920 trees for Arbor Day.

Kauai: Mr. Joe Rita, Jr. reports that he distributed 200 trees for Arbor Day.

Summary:

Oahu	4370
Hawaii	1215
Maui	920
Kauai	200
Total	6705

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

REPORT OF THE ENTOMOLOGIST, NOVEMBER, 1920.

Honolulu, Hawaii, December 9, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—During the month of November the insectary handled 17,100 pupae of the melon fly, from which were bred 2,983 females and 2,413 males *Opus fletcheri*.

The distribution of parasites was as follows:

MELON FLY PARASITE.

Opius fletcheri.

Oahu:	Female	Male
Molili 700	700	
Kaneohe 200	200	
Metcalf St. 300	300	
Oahu Prison 300	300	
Nuuanu Avenue 250	250	

FRUIT FLY PARASITES.

Diachasma tryoni.

Oahu:			
Kalihi Valley	400	400	-
Maui:			
Paia	50	50	

Diachasma fullawayi.

Oahu:			
Kalihi Valley	400	400	
Maui:			
Paia	50	50	

Diachasma giffardi.

Oahu:			
Nuuanu Ave.			800

Tetrastichus giffardianus.

Oahu:			
Kalihi Valley			100

Galesus silvestri.

Oahu:			
Nuuanu Ave.			1200

HORN FLY PARASITE.

Spalangia cameroni.

Oahu:			
Moanalua Dairy			1400

Respectfully submitted,

DAVID T. FULLAWAY,
Entomologist.

DIVISION OF PLANT INSPECTION.

REPORT OF THE CHIEF PLANT INSPECTOR, NOVEMBER, 1920.

Honolulu, Hawaii, November 30, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work carried on by the Division of Plant Inspection for the month of November, 1920, as follows:

During the month 50 steamers arrived at the Port of Honolulu, 20 of which carried vegetable matter and 6 came through the Canal Zone. The following disposal was made of the various shipments:

Passed as free from pests....	1718 lots	36,182 pkgs.
Fumigated	20 "	20 "
Burned	63 "	63 "
Returned	1 "	1" "
Total inspected		1802
		36,266

Of these shipments 35,869 packages arrived as freight, 237 as baggage and 160 as mail.

RICE AND BEAN SHIPMENTS.

During the month 34,229 bags of rice from Japan, 280 matts of rice from China and 1426 bags of beans from Japan arrived clean.

PESTS INTERCEPTED.

Approximately 5173 pieces of baggage belonging to immigrants from foreign countries were examined, from which 34 lots of fruit and 15 lots of vegetables were seized and destroyed.

On November 2 a package of roots from Japan and 2 packages of Betel nuts from Manila, all in the mail, were fumigated precautionary. A package containing lily bulbs, fern fronds, anemone roots, moss, chestnuts and yams was found in the baggage of a passenger. A large colony of *Prenolepis* sp. was found in the packing; all but the chestnuts and yams were destroyed which in turn were released after fumigation.

On November 5 a package of tree seeds from Mr. Kushi, North Queensland was found in the mail for Dr. Lyon and fumigated precautionary. In this package was a dead land shell for the Bishop Museum and some *Diptera* pupae (*Phoridae*) were in the shell. Evidently it was not thoroughly cleaned when packed. A package of dead butterflies from Mr. Kushi for the Bishop Museum were also fumigated precautionary. Two packages of tree seeds and a bag of large beans were found in the mail for Dr. Lyon from C. E. Pemberton, Suva, Fiji. In the latter, 2 lepidopterous larvae were found and all seeds were fumigated with carbonbisulphide.

On November 7 a package of tree seeds and a package of Palm seeds were found in the baggage of passengers from the Orient. These were destroyed. A package of tree seeds in the mail from Japan for Dr. Lyon was fumigated precautionary.

On November 17 a package of corn was taken from the baggage of an immigrant from Japan and destroyed. Fourteen packages of Chestnuts were also found in the baggage. Eleven were badly infested with moth larvae and weevils and were destroyed; the other three were fumigated precautionary and released. A bag of yams in the cargo from Japan was fumigated and later released, an ant colony (*Prenolepis* sp.) being found in the lot. The Oriental mail brought 5 packages of *Chaunmoogra* seed from Prof. Rock, Siam, for Dr. Lyon, also a package of Chestnuts from Japan. These were all fumigated precautionary.

On November 20 a package of Walnuts was taken from an immigrant from the Orient and destroyed.

HILO INSPECTION

Brother M. Newell, Inspector at Hilo, reports the arrival of 6 steamers at Hilo; 4 carried vegetable matter consisting of 195 lots and 3,590 parcels, all clean.

KAHULUI INSPECTION.

Mr. L. Gillin, Inspector at Kahului, reports 4 vessels arriving at Kahului; 2 carried vegetable matter consisting of 14 lots and 3,233 parcels, all clean.

INTER ISLAND INSPECTION.

Fifty-seven steamers plying between Honolulu and other Island ports were attended and the following shipments passed:

Taro	221 bags
Vegetables	199 cases
Fruit	170 packages
Plants	106 packages
Pine Shoots	2520 bags
Seeds	4 packages

Total passed 3220 packages

Twenty packages of plants, 5 packages of fruit and 1 package of sugar cane were rejected on account of infestation, undesirable soil and non-compliance with rules.

Respectfully submitted,

E. M. EHRHORN,
Chief of Division.

DIVISION OF ANIMAL INDUSTRY.

REPORT OF THE TERRITORIAL VETERINARIAN,
NOVEMBER, 1920.

Honolulu, Hawaii, December 8, 1920.

Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I have the honor to submit the following report for the month of November, 1920:

TUBERCULOSIS CONTROL.

Owing to the prolonged sickness of Mr. Richard the work in tuberculosis eradication was confined to the testing and examination of nine cows at the quarantine station, all of which passed the test.

ANTI-RABIC TREATMENTS.

During the past month five dogs have received the anti-rabic vaccinations and all are apparently doing well.

IMPORTATIONS OF LIVE STOCK.

During the past month 21 vessels were boarded and inspected, out of which number 9 were found to carry live stock for this port.

The following classes of live stock were represented:

Horses	Mules	Cattle	Dogs	Poultry	Swine
15	54	1	7	75	441

PROPOSED AMENDMENTS TO RULE VII—SWINE.

In view of the fact that large importations of butcher hogs will be arriving in the Territory from time to time from now on the following changes and additions to "Rule VII—Swine" of the present importation regulations are recommended.

First—Sec. 1, line 1, after the word "All" insert the words "pure-bred."

Sec. 1, line 2, after the word "Hawaii" insert the words "for breeding purposes."

Sec. 3, line 1, before the word "Swine" insert the words "pure-bred."

Second—The addition of the following sections:

Sec. 4. Swine, other than pure-bred, shall be refused entry into the Territory unless accompanied by the certificates and affidavits as in Sections 1 and 2 described and shall be imported for the purposes of slaughter only.

"Sec. 5. Such swine shall be unloaded from the vessel into cars or drays and transported direct to the point of slaughter.

"Sec. 6. All such cars or drays shall be thoroughly cleaned and disinfected under the supervision of the Territorial Veterinarian before being allowed to return for reloading.

"Sec. 7. All expense connected with such cleaning and disinfection shall be borne by the owner or importer."

It is therefore recommended that action be taken on the above amendments as soon as possible because of the fact that a large number of butcher hogs are now on the way from California and due to arrive in the next two or three days.

The shipment of hogs is for C. Q. Yee Hop & Co., who received the following cable on the 18th:

"Yee Hop:—Leaving today with hogs subject to two weeks quarantine." (s) LOCEY."

The wording of the above cablegram leaves little doubt that no attempt was made by the importer to secure certificates of health or affidavits as to the absence of infectious diseases of swine in the districts where purchased but that a direct attempt was made to take advantage of Sec. 3 of the present regulation, which section when written was intended to apply to pure-bred breeding stock only and not to be used as an excuse to import stock without the requisite health certificates.

The chances of introducing virulent strains of infectious diseases of swine in shipments of this character are great and we do not want any repetition of such importations as occurred in June of 1909 when hogs arrived here sick and dying of hog cholera and had to be transported miles through the city to the quarantine station.

Respectfully submitted,

LEONARD N. CASE,
Territorial Veterinarian.

OFFICERS:

E. Faxon Bishop, President
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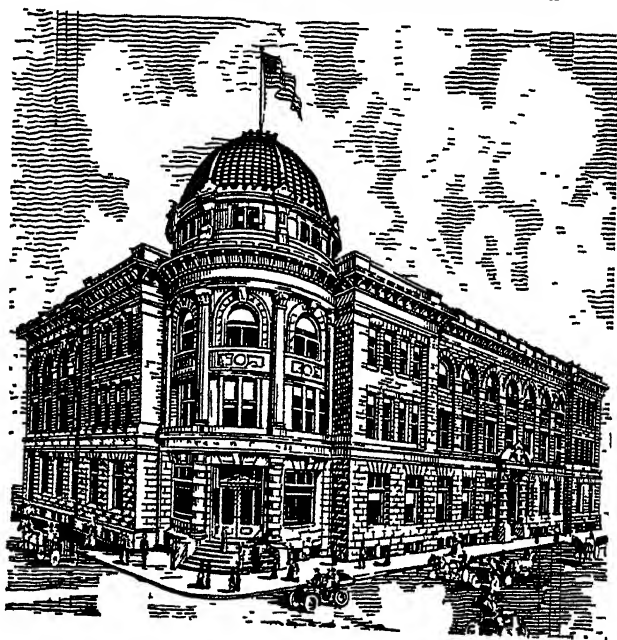
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